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THE OCCIPITO-POSTERIOR POSITIONS OF THE VERTEX AND THEIR COMPLICATIONS *

BY

CHASSAR MOIR, M.D., F.R.C.S.Ed., F.C.O.G.

Nuffield Professor of Obstetrics and Gynaecology, University of Oxford

In opening this discussion on the occipito-posterior positions of the vertex it is necessary to define and limit the conditions about which we are to speak. For the purpose of promoting a useful discussion I propose that we should consider the case of the patient at or about full term, in whom labour is unduly protracted, and in whom the foetal head presents with the occiput in some position other than the anterior or antero-lateral. By choosing this definition we shall include the common occipito-lateral position, which, if it persists until the head is driven low into the pelvis, may give rise to serious difficulty, and is then often spoken of as "deep transverse arrest" of the head.

Ere confining myself to the above limitations, subsequent discussion may be clarified if a few words are said regarding ante-natal examination. Different authorities give widely differing estimates of the frequency of the occipito-posterior position in the ante-natal clinic. I believe that the reason for this discrepancy lies in the fact that in the majority of women the occiput, before labour, points directly laterally, or lies within a few degrees of this position. If the custom is observed of classifying the position according to one of four possibilities, it becomes a personal matter whether such cases are classified as "anterior" or "posterior." Here I would make a plea for the freer use of the terms "L.O.L." and "R.O.L.," which more accurately describe the position in question.

Not till labour starts does the head usually come to lie in one or other oblique diameter of the pelvis; normally the occiput rotates forward, much more rarely it rotates backwards, and in exceptional circumstances it may even come to lie in the hollow of the sacrum. It is convenient here to say that I view with much misgiving the habit which seems to be arising of trusting to abdominal examination to determine the position of the foetal head. Such examination *may* give fairly reliable information in the ante-natal clinic, but it becomes increasingly inaccurate as labour advances and the head sinks into the pelvis. Moreover, it is sometimes mere guesswork to diagnose the position of the foetal head from palpation of the body. I have seen a patient in whom the foetal occiput was situated well within the posterior half of the pelvis while the foetal back was still distinctly anterior; and *x*-ray examination has also shown many instances of pronounced rotation of the foetal head on the neck. Attempts to "divine" the position of the head are dangerous, and in dealing with a patient whose labour is unduly protracted a thorough vaginal examination is essential, and nothing short of this can give the required information. I shall refer to this matter again later.

Frequency of Persistent Occipito-posterior Position of the Head

It is common knowledge that the great majority of posteriorly placed heads rotate to the front during labour, and that a spontaneous delivery is the rule rather than the exception; we have here to discuss the case in which rotation does not occur and in which the labour is unduly prolonged. Although such cases form but a small proportion of the whole they constitute a major problem in obstetrics. At a meeting of this Section in 1928 Dr. Douglas Miller read a paper on "Unsuccessful Forceps Cases," and presented an analysis of statistics gathered from various maternity hospitals which showed that the occipito-posterior position of the head—usually undiagnosed—was associated with nearly one-third of the total number of cases. Had the "rachitic areas" of the country been excluded from this analysis the proportion would doubtless have been even higher.

Cause of Dystocia

The increased difficulty of labour associated with a posterior position of the occiput is usually ascribed to a larger diameter of the foetal head being forced through the pelvis. No doubt there is truth in this belief, but I confess that the more I study the actual foetus after delivery in such cases the less impressed am I with this explanation. The real cause of the difficulty is, I believe, a simple one, and is essentially a maladjustment of the shape of the foetus to the shape of the birth canal. The baby after birth lies with the long axis of the head at an angle to the long axis of the body. In other words, the foetal contour is sharply angled or curved. The birth canal through which this foetus is forced is also sharply bent at the lower end, and it is only when the two curves coincide (as in the occipito-anterior case) that easy delivery results. To use an analogy, if I force my foot and leg (which are angled to each other at the ankle) through a tall Wellington boot (which is also curved at the ankle)

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my foot will slip into position only if the two angles or curves coincide. Were I to attempt to thrust my foot down backwards, progress would be arrested at the ankle of the boot, and if great force were used either my foot would be sorely bruised or the boot would be ruptured. If, however, I now use skill and carefully rotate my foot round to the normal position, I am able to push my foot with ease to the bottom of the boot. Essentially similar mechanical difficulties arise in the birth canal when the head descends with the occiput directed posteriorly. This conception introduces the theory of the unequal foetal flexibilities, which I have fully discussed elsewhere (1932).

"Face-to-pubes" Delivery

It is true that delivery can sometimes be accomplished with surprising ease when the foetus lies with the face directed towards the pubes, but usually in such cases the mother's pelvis is abnormally large (a fairly common finding) or the foetus is small. Occasionally, too, delivery is facilitated by a lax or absent perineum, which results in a virtual abolition of the normal curve of the birth canal. To quote such cases as an argument against the need for rotation of a posteriorly placed head in obstructed labour is to my mind false reasoning. I am aware that at least one school of midwifery holds views to the contrary, but I maintain that while a foetus *may* be born without difficulty in the face-to-pubes position, it is certain that delivery can be still more easily accomplished if the occiput is directed anteriorly; and when in addition the relative sizes of the foetus and pelvis are such that there is likely to be slight dystocia, then the added handicap of the occipito-posterior position becomes a serious matter, and is not infrequently the cause of complete obstruction to delivery.

These remarks are commonplace, and must seem superfluous to anyone who, after unsuccessfully attempting to deliver the foetus in the posterior position, has rotated the head and reapplied the forceps correctly; for the ease with which delivery can then be accomplished is often astonishing, and cannot fail to make a lasting impression on the operator. Yet all too often one hears excuses made for omitting to rotate the posteriorly placed head as a preliminary to forceps delivery. I believe that reluctance to perform this simple operation is due to the prevalence of a false idea regarding its supposed difficulty, which in turn finds origin in the fact that details of the correct manœuvres are seldom taught to, and are still more rarely learned by, the average undergraduate student.

Recently some new light has been thrown on the problems of the mechanics of labour by the use of radiological methods of study. Some years ago Thoms (1933) of the Yale Medical School drew attention to the frequency with which occipito-posterior positions of the foetus are associated with the dolichopellic pelvis—that is, the pelvis in which the antero-posterior exceeds the transverse measurement of the brim. More recently Caldwell, Moloy, and D'Esopo (1935, 1936) of the Sloane Hospital for Women, New York, using advanced methods of *x*-ray study, have confirmed this finding, and in a personal communication expressed the view that in certain types of pelves delivery can be more easily accomplished if the foetal head lies with the occiput in the posterior position. I respect the opinion of these workers and look forward with eagerness to their further contributions to obstetrics, but it is only right to say that the evidence so far presented by the latter group is not likely to lead to the general acceptance of the last-mentioned claim. In any event such pelves are extremely rare, and their detection requires the use of *x*-ray pelvimetry; in the meantime it therefore seems unwise to complicate obstetrical teaching on this simple issue in order that the very exceptional case may be treated by methods of as yet unproved superiority.

Cause of Non-rotation of Head

Non-rotation or malrotation of the foetal head may result from several causes. I have already mentioned three—a large pelvis, a small foetus, and a deficient perineum. In such cases there is usually an easy delivery. Certain unusual postures of the foetus *in utero* or an increased inclination of the pelvis may both, in my opinion, favour a posterior lie of the head and hinder its forward rotation. A poorly flexed foetal head is another important cause of non-rotation. In such a case the long axis of the head is no longer set at an angle to the long axis of the body; the forces which normally bring about rotation are therefore not evoked, and obstruction may result.

Still more serious are the cases in which non-rotation of the head is a manifestation of some other abnormality. Not infrequently persistence of the posterior position is associated with a mild degree of pelvic contraction which delays or prevents the head from reaching the lower pelvis and reacting to the curve of the birth canal. Serious obstetrical difficulties may then arise, for the combination of abnormalities is far more difficult to deal with than either taken separately. Similarly, in the occipito-posterior case there is often an early escape of liquor amnii, and this, together with the prolonged labour, favours abnormal retraction and moulding of the uterine muscle around the foetal neck—the so-called contraction ring of the uterus. This condition is by no means unusual, and should always be looked for if difficulty is encountered in rotating the foetus. Speaking from my own experience, I have no qualms in dealing with the uncomplicated posteriorly placed head, but I dread a narrowing of the lower pelvis or a contraction ring of the uterus, of both of which conditions the persistence of the posterior position of the occiput is sometimes merely the token.

Danger to Mother and Foetus

The increased danger associated with non-rotation of the head is strikingly shown by a table which I borrow from Douglas Miller's excellent paper on the subject (1930). The foetal mortality is deplorably high, yet, especially with regard to cases in which the child is forcibly extracted in the face-to-pubes position, the danger is actually underestimated, for many infants die in the first days of life or suffer from injuries of a non-fatal variety. The forceps blades do not take a kindly hold of the posteriorly placed head: they are difficult to lock, and they easily slip, causing serious injury to the vagina. Extraction is almost impossible without rupture of the perineum, and the tear may easily extend into the rectum.

Table showing Danger associated with Non-rotation of the Head (after Miller)

	Termination	
	Spontaneous Forward Rotation	Failure to Rotate
Maternal mortality	Nil	2.0%
Foetal mortality	2.7%	22.3%
Puerperal morbidity	6.5%	22.3%

It is perhaps not sufficiently realized that the majority of babies which die during forceps extraction are killed because the forceps blades are wrongly applied, the operator having omitted the preliminary step of rotating the occiput completely to the front. It would be an exaggeration to say that injuries such as facial paralysis and tentorial tears never occur when the blades are correctly applied over each maxilla, but I believe that such a statement would not depart far from the truth. It is always instructive to examine the baby's head after forceps delivery; too often the tell-tale marks make it disappointingly evident that the blades have been applied, not to the robust maxillae, but to the yielding brow and occipito-mastoid region; and from this fact one may deduce that dangerous compression of the cranial vault has taken place. It is not always easy to rotate completely the head which is in "deep transverse arrest," but with practice this manœuvre is usually successful, and by its accomplishment the chances of safe delivery of the foetus are greatly improved.

The Course of Labour and Diagnosis

I shall not do more than touch on diagnosis. Late engagement of the head and early rupture of the membranes in the absence of disproportion between the head and pelvis is an ominous sign. A foetal heart heard far out on the flank, or more especially one heard faintly over a wide area of lower abdomen, may help in diagnosis but must not be relied on.

The character of the uterine contractions is often peculiar. They are short, painful, and unaccompanied by bearing-down effort. It might be supposed that such ineffective contractions are the primary abnormality and the cause of the slow advance of the foetus, but I tend to the view that when the head descends into the occipito-posterior position the vagina is not evenly distended, and consequently the reflex which normally augments contractions and compels the patient to bear down is not evoked. I am always suspicious of the patient who, although she has started labour well, has made little or no advance over several hours, and about whom the nurse in charge querulously exclaims, "If only she would use her pains!" Such a patient should be carefully examined, and not infrequently it will be found that the foetal head has remained unrotated in the occipito-posterior position.

I have already referred to the frequency with which non-rotation of the head is associated with obstructed labour, yet in spite of the commonness of the condition many of these cases remain undiagnosed until too late. The chief reason for this is that the suture lines are obscured by an oedematous scalp; it is only by passing the fingers to a higher level and feeling the foetal ear that a certain diagnosis can be made. To do this an anaesthetic is necessary, and the whole hand suitably lubricated must be gently inserted into the vagina. Such an examination should always precede forceps delivery in any case of doubt. That grand old man of obstetrics Sir Halliday Croom used to speak of this procedure as the "trump card" of obstetrics. I cannot do better than end with his famous words, "Gentlemen, gentlemen, I pray beg each one of you, *when in doubt play trumps.*"

REFERENCES

Caldwell, W. E., *et al.* (1935). *Amer. J. Obstet. Gynec.*, **30**, 763.
—— —— (1936). Ibid., **32**, 727.
Miller, D. (1928). *British Medical Journal*, **2**, 183.
—— (1930). Ibid., **1**, 1036.
Moir, C. (1932). *J. Obstet. Gynaec. Brit. Emp.*, **39**, 84.
Thoms, H. (1933). *Surg. Gynec. Obstet.*, **56**, 97.

INTERRUPTION OF EARLY PREGNANCY BY MEANS OF ORALLY ACTIVE OESTROGENS

BY

A. S. PARKES, Sc.D., F.R.S.

(From the National Institute for Medical Research, London)

E. C. DODDS, M.D., D.Sc., F.R.C.P.

AND

R. L. NOBLE, M.D.*

(From the Courtauld Institute of Biochemistry, Middlesex Hospital, London)

It was found many years ago that the injection of oestrogenic extracts after mating interfered with the establishment of pregnancy (Smith, 1926; Parkes and Bellerby, 1926), and subsequent work, including numerous experiments carried out with pure hormone substances, has amply confirmed this observation. Small doses of an oestrogen prevent the ova of mice from passing down the tube (Burdick and Pincus, 1935), while larger doses cause abnormal acceleration of transit (Burdick and Whitney, 1937). Both types of disturbance cause death of the blastocyst. In the rabbit the cleavage rate of the egg is not affected by the injection of oestrone after ovulation, but the embryos die; the maximum sensitivity to oestrone is on the third and fourth days after mating (Pincus and Kirsch, 1936; Pincus, 1936, may be consulted for further discussion).

The prevention of progestational changes in the uterus of the rabbit after ovulation, by injection of oestrogenic hormones, has been extensively studied by Courrier and his co-workers. Adequate doses of oestrone given in the early stages of the luteal phase will suppress endometrial proliferation and prevent implantation of the egg. The administration of oestrone after implantation has taken place causes death of the embryo. The rabbit is very sensitive up to the fourth day after mating, less so on the fifth and sixth, and more so again at the twelfth (Courrier and Kehl, 1932; Courrier and Reynaud, 1933, 1934).

The action of oestrone in inhibiting progestational changes in the uterus is well shown, and can be quantitatively assessed, by experiments on immature or ovariectomized test animals sensitized with oestrone and then injected simultaneously with progesterone and varying amounts of oestrone (Hisaw and Leonard, 1930; Allen, 1932; Robson, 1936; Zuckerman, 1937).

In view of these facts it is clearly of the greatest importance to know whether oral administration of oestrogens can be made effective enough to prevent or disturb implantation of the blastocyst. Recently a new derivative of oestradiol has been prepared by Inhoffen and Hohlweg (1938). This substance, ethinyl oestradiol, is reported to be seventeen times as active by mouth as oestradiol (Inhoffen, Logemann, Hohlweg, and Serini, 1938). Further, the new synthetic oestrogen, diethyl-stilboestrol, prepared by Dodds, Golberg, Lawson, and Robinson (1938), the biological properties of which have been described by Dodds, Lawson, and Noble (1938), is reported to be highly active by mouth. The capacity of these two substances, given orally, to suppress the progestational action of progesterone and to prevent the establishment of pregnancy has therefore been investigated.

* Leverhulme Fellowship, Royal College of Physicians of London.

Administration

The substances were fed to rabbits in propylene glycol solution, which was swallowed readily. Diethyl-stilboestrol was administered to the rats in oil solution by stomach tube under brief ether anaesthesia. The concentrations were so adjusted that the maximum daily dose was 1 c.cm.

Inhibition of the Effect of Progesterone on the Uterus of the Immature Rabbit

Immature female rabbits were sensitized with three doses of 50 I.U. (0.005 mg.) of oestrone according to the technique of McPhail (1934). They were then given a standard dose of 0.6 I.U. (0.6 mg.) of progesterone in oil solution over three days by subcutaneous injection, together with varying amounts of ethinyl oestradiol or diethyl-stilboestrol by mouth. It was found that total doses of 0.15 mg., 0.3 mg., and 0.75 mg. of the oestrogens very greatly decreased the progestational proliferation caused by the progesterone, while 1.5 mg. and 3 mg. abolished it. It was difficult to assess accurately the slight proliferation occurring with the medium doses of the oestrogens, but it seems that diethyl-stilboestrol is slightly less effective than is ethinyl oestradiol in suppressing progestational proliferation.

Inhibition of Implantation in Rabbits

Technique and Controls.—Adult rabbits which had been isolated for several weeks were mated, and most of them were laparotomized one to three days later to ascertain if ovulation had taken place. Of twenty-four so examined twenty-two were found to have ovulated. Of twenty mated rabbits which received no treatment, or only control propylene glycol by mouth during the first week, implantation took place in eighteen. The implantation rate, therefore, was good.

Oral Administration of Ethinyl Oestradiol.—Seven rabbits received ethinyl oestradiol during the first week after mating, and were killed and examined at from six to nine days *post coitum*, when progestational proliferation should have been well advanced. The details are given in Table I. The uteri of the four which were treated

TABLE I.—*Effect of Ethinyl Oestradiol by Mouth on Implantation in the Rabbit*

No. of Rabbit	Ethinyl Oestradiol given			Rabbit Killed, Days after Mating	Normal Implantations	Progestational Proliferation of Endometrium
	Days after Mating (inclusive)	Daily Dose in mg.	Total Dose in mg.			
DNT 20	5–6	0.25	0.5	9	2	Normal
DNT 19	5–6	0.25	0.5	9	2	,,
DNT 23	2–6	0.25	1.25	6	0	Slight
DNT 3	3–4	1	2	8	0	Some
DNT 22	2–6	0.5	2.5	6	0	Slight
DNT 6	2–7	0.5	3	8	0	None
DNT 5	2–7	1	6	8	0	,,

for five or six days showed little or no progestational proliferation, although the corpora lutea in the ovary seemed quite normal. The two larger doses had caused tremendous oedema and hyperaemia of the uteri. In the rabbit receiving two doses of 1 mg. the endometrium had proliferated, but the glandular development was poor for eight days after ovulation. There were no signs of pregnancy in these rabbits. In the two animals receiving doses of 0.25 mg. on the fifth and sixth days after mating, implantation had not been entirely inhibited, though the number of embryos (two) found in each was much below the number of corpora lutea, suggesting that there was partial failure. The results in general leave no doubt that ethinyl oestradiol by mouth is effective in preventing implantation after mating and ovulation.

Oral Administration of Diethyl-stilboestrol.—The results with diethyl-stilboestrol are given in Table II. It will be

TABLE II.—*Effect of Diethyl-stilboestrol by Mouth on Implantation in the Rabbit*

No. of Rabbit	Diethyl-stilboestrol given			Rabbit Killed, Days after Mating	Normal Implantations	Progestational Proliferation of Endometrium
	Days after Mating (inclusive)	Daily Dose in mg.	Total Dose in mg.			
DNT 41	3–7	0.5 (twice daily)	5	8	1	Good
DNT 42	3–7	0.5 (twice daily)	5	8	2	Subnormal
DNT 24	3–8	1	6	10	0	Good
DNT 25	3–8	1	6	10	0	Subnormal
DNT 28	2–7	1	6	9	0	,,
DNT 35	3–7	2	10	8	0	Very slight
DNT 38	3–7	2	10	8	0	Slight
DNT 39	3–7	4	20	8	0	,,
DNT 40	3–7	4	20	8	0	,,

seen immediately that 1 mg. daily given over a five-day period after mating does not entirely prevent the occurrence of normal implantations, while the endometrial proliferation is not seriously interfered with. A similar dose of ethinyl oestradiol caused profound uterine changes quite incompatible with implantation of blastocysts. With larger doses of diethyl-stilboestrol normal implantations were not found, but a total of 10 mg. was required before the progestational proliferation was mainly inhibited. Not until 20 mg. was given did the intense hyperaemia and congestion of the uterus appear which was found even with 3 mg. of ethinyl oestradiol. Both the microscopic and the macroscopic observations leave no doubt that diethyl-stilboestrol is effective in preventing implantation and progestational proliferation of the endometrium in the mated rabbit, but it is much less effective than ethinyl oestradiol. In several of the animals receiving the smaller doses of diethyl-stilboestrol there were nodules in the uterus which were obviously not normal implantations, and which seemed to consist of a decidual reaction with a degenerate vesicle. It is likely that a degree of inhibition of progesterone had been attained incompatible with the continued survival of the blastocyst, but inadequate to prevent decidua formation.

Inhibition of Implantation in Rats

Technique and Controls.—Female white Wistar rats weighing 150 to 250 grammes were segregated after detection of mating by the presence of a vaginal plug. Oral administration of diethyl-stilboestrol began one day later. The total dose was dissolved in 3 c.cm. of oil, and 1 c.cm. was given daily for three consecutive days. The animals were killed on the eighth day *post coitum*. Control animals received oil only.

Oral Administration of Diethyl-stilboestrol.—The results given in Table III showed that implantation occurred in eight of eleven control rats and in two of three receiving

0.001 mg. of the oestrogen. It occurred in only three of eleven rats receiving between 0.005 and 0.016 mg., and was completely absent in thirteen rats receiving larger

TABLE III.—*Effect of Diethyl-stilboestrol by Mouth on Implantation in Rats*

Total Dose gamma	No. of Rats	Pregnancy	Total Dose gamma	No. of Rats	Pregnancy
0	11	8	20	3	0
1	3	2	30	3	0
5	3	1	50	2	0
10	6	1	100	2	0
16	2	1	200	3	0

doses. It is thus evident that this new synthetic oestrogen given by mouth is highly effective in preventing implantation in rats.

Interruption of Established Pregnancy

Technique and Controls.—Fifteen rabbits were used for experiments on established pregnancy. A preliminary laparotomy under ether anaesthesia at eight to twelve days after mating was made in twelve of these to confirm the presence of normal implantation. Five of those laparotomized received control treatment with propylene glycol alone, and all were subsequently found to have normal foetuses.

Oral Administration of Ethinyl Oestradiol.—Six rabbits were treated with ethinyl oestradiol by mouth, beginning nine or ten days after mating, and were killed at twelve to fourteen days. The details are shown in Table IV. All

TABLE IV.—*Effect of Ethinyl Oestradiol by Mouth on Established Pregnancy in the Rabbit*

No. of Rabbit	Ethinyl Oestradiol Given			Rabbit Killed, Days after Mating	Condition of Embryos
	Days after Mating (inclusive)	Daily Dose in mg.	Total Dose in mg.		
DNT 17	9–10	0.1	0.2	13	2 normal conceptions; 5 resorbing
DNT 7	9–10	0.25	0.5	13	4 resorbing
DNT 8	9–10	0.25	0.5	13	9 „
DNT 15	10–11	0.25	0.5	14	8 „
DNT 10	8–9	0.5	1	12	7 „
DNT 2	9–11	0.5	1.5	13	2 „

the embryos in the rabbits receiving a total of 0.5 mg. or more were resorbed or undergoing resorption. In the remaining animal, receiving 0.2 mg., two live foetuses were found in seven implantation sites. Observations on the state of the resorbing conceptuses seem to agree substantially with those made by Courrier, and there can be little doubt that identical effects are produced by the injection of oestrone and the oral administration of ethinyl oestradiol.

Oral Administration of Diethyl-stilboestrol.—A rabbit receiving 1 mg. of this oestrogen on the thirteenth, fourteenth, and fifteenth days after mating was found on the seventeenth day to contain ten embryos, all being reabsorbed. A similar dose on the eleventh, twelfth, and thirteenth days, and half this dose on the tenth, eleventh, and twelfth days in other rabbits did not disturb pregnancy. It is evident, therefore, as in the work on implantation, that the denidatory effectiveness of diethyl-stilboestrol is much less than that of ethinyl oestradiol.

Discussion

The above results indicate that small doses of orally active oestrogen administered by mouth will prevent implantation of the blastocyst if given soon after ovulation, or may terminate established pregnancy. The effect is produced in what is essentially a physiological manner: the luteal phase of the cycle is suppressed, and another phase induced which, though not abnormal in itself, is unsuitable for the development of the embryo.

Everything we know about the menstrual cycle of primates suggests that its hormonal control is the same as in lower animals, and it is extremely probable that the factors governing the implantation of the fertilized egg are fundamentally similar in women and in lower animals. The experimental conclusions arrived at above should thus be applicable to women, though the fact that very large amounts of oestrogen are excreted by pregnant women makes it likely that the period during which oestrogen treatment might be effective would be relatively much shorter than in rabbits.

It would be unwise at the present juncture to make a comparison of the relative suitability of the two substances examined, or of other orally active oestrogens, for the purpose under consideration. Effectiveness in this kind of test must be greatly influenced by conditions of absorption from the alimentary canal, and these conditions certainly vary from species to species. It is difficult to predict what type of substance would be most effectively absorbed by mouth in women. Further, the intensive work at present being carried out on the artificial production of oestrogenic substances may well result in the production of a compound also active by mouth, but more effective in suppressing the tubal and uterine changes necessary for implantation of the fertilized egg than either of those so far examined.

Summary

Experiments have been carried out on the inhibition of implantation and the interruption of established pregnancy by the oral administration of two new oestrogens—ethinyl oestradiol and diethyl-stilboestrol. Both of these substances given by mouth inhibit the effect of progesterone and prevent implantation of the blastocysts in rabbits. Small doses of diethyl-stilboestrol prevent implantation in rats, while ethinyl oestradiol is highly effective in interrupting established pregnancy in rabbits.

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REFERENCES

Allen, W. M. (1932). *Amer. J. Physiol.*, **100**, 650.
Burdick, H. O., and Pincus, G. (1935). Ibid., **111**, 201.
—— and Whitney, R. (1937). *Endocrinology*, **21**, 37.
Courrier, R., and Kehl, R. (1932). *C. R. Soc. Biol.*, Paris, **109**, 877.
—— and Reynaud, R. (1933). Ibid., **115**, 299.
—— —— (1934). Ibid., **116**, 1073.
Dodds, E. C., Golberg, L., Lawson, W., and Robinson, R. (1938). *Nature*, **141**, 247.
—— Lawson, W., and Noble, R. L. (1938). *Lancet*, **1**, 1389.
Hisaw, F. L., and Leonard, S. L. (1930). *Amer. J. Physiol.*, **92**, 574.
Inhoffen, H. H., and Hohlweg, W. (1938). *Naturwissenschaften*, **26**, 96.
—— Logemann, W., Hohlweg, W., and Serini, A. (1938). *Ber. dtsch. chem. Ges.*, **71**, 1024.
McPhail, M. K. (1934). *J. Physiol.*, **83**, 145.
Parkes, A. S., and Bellerby, C. W. (1926). Ibid., **62**, 145.
Pincus, G. (1936). *The Eggs of Mammals*. New York.
—— and Kirsch, R. E. (1936). *Amer. J. Physiol.*, **115**, 219.
Robson, J. M. (1936). *J. Physiol.*, **88**, 100.
Smith, M. G. (1926). *Johns Hopk. Hosp. Bull.*, **39**, 204.
Zuckerman, S. (1937). *Proc. roy. Soc.*, B, **124**, 150.

OBSERVATIONS ON THE TREATMENT OF EMPYEMA IN CHILDREN *

BY

H. L. WALLACE, M.D., F.R.C.P.Ed.

Assistant Physician, Royal Edinburgh Hospital for Sick Children; Lecturer in Child Life and Health, University of Edinburgh

It is with some misgiving that I open a discussion on the treatment of empyema in children, since it is perhaps doubtful whether a physician is qualified to pronounce judgment on a subject regarded by many as being essentially surgical. And yet surely empyema is a disease which should vitally concern both physician and surgeon and which, almost more than any other, demands a close liaison between the two. The belief has been stated that there is a wide field in medicine to-day for the operating physician, and if such a person were available on the staff of every large hospital it might well be that the treatment of empyema would be in relatively safer hands than it is at present. There is perhaps a tendency to-day for the unfortunate child with empyema to fall between the two stools of medicine and surgery and, while conservatism and radicalism grapple with each other for pride of place in the scheme of treatment, the resulting delay and indecision may not react very favourably on the patient.

When discussing a wide and somewhat controversial subject such as this it would seem advisable, so far as is possible, to avoid mention of personal preference or impressions regarding treatment, since these are apt so readily to assume the guise of personal prejudice, which can only tend to complicate and distort the issue. I propose, therefore, to present a general review of the treatment of empyema as practised in the Royal Edinburgh Hospital for Sick Children during the past fifteen years. By this means it is hoped to obtain a reasonably detached and unbiased view of the situation and to assess the relative merits of the several methods of treatment. Before proceeding to details of these methods it is necessary to introduce an explanatory note to the effect that each type of procedure to be described was adopted by choice and not by expediency. To appreciate this is of importance, since it is common experience that children with empyema are sometimes admitted to hospital in such a low state of vitality that only the most conservative measures dare be employed, and even the minimum of intervention may be attended with grave risk. These emergency cases constitute a separate problem, and are not included in the sections concerned with the various methods of treatment, although brief reference is made to them in a later section.

During the fifteen-year period 1923 to 1937, inclusive, 363 cases of empyema were received into the wards of the Royal Edinburgh Hospital for Sick Children. Fifteen arrived *in extremis* and died within forty-eight hours; these have been omitted, since they were almost certainly beyond the reach of any form of treatment. The series under discussion therefore comprises 348 cases, and the various methods of treatment adopted will now be considered. In the first place, procedures which may be classed as conservative will be briefly discussed and certain of the more radical measures then considered.

* Read in opening a discussion in the Section of Diseases of Children at the Annual Meeting of the British Medical Association, Plymouth, 1938.

Conservative Treatment

REPEATED ASPIRATION

Drainage of the empyema by means of aspiration of pus from the thorax at frequent intervals was the procedure of choice in sixty cases, or 17.2 per cent. of the total series. As might be expected, this conservative method was favoured in very young children, one-half of those treated in this manner being under 2 years of age. The most successful results were obtained where the empyema was small in amount, and in six cases a single paracentesis sufficed to drain the cavity completely. Where the effusion was large this mode of treatment could not be regarded as very satisfactory, since the mortality was high and, in the cases which did eventually recover, the period of convalescence was often both long and difficult. The average length of stay in hospital after the development of empyema in these cases was 8.8 weeks. In three of those who survived, open operation had to be resorted to in the end in order to obtain adequate drainage, and it is at least a possibility that the fatalities would have been fewer if similar measures had been adopted with greater frequency and at an earlier stage in the illness.

TABLE I.—*Showing the Results of Treatment by Repeated Aspiration*

Age	Cases	Recoveries	Deaths	Mortality per cent.
Under 2 years ..	30	10	20	66.6
2–5 years	22	19	3	13.6
5–12 years	8	8	0	Nil
Totals	60	37	23	38.3

In this, as in subsequent tables, the cases have been divided into three age groups, and the very striking variation in the mortality rate according to age will be noted. The large number of fatalities which occurred during the period of infancy in this group is somewhat disquieting, since the simple procedure of aspiration is apt to be the method of choice in infants and very young children on account of its comparative safety. It would seem that in large effusions free and thorough drainage of the pleural sac is difficult to obtain by this method, and the resulting prolonged toxaemia may bring about a fatal issue before such drainage can be accomplished.

The infecting organisms isolated in this group were as follows:

Pneumococcus ..	55 cases	Streptococcus ..	1 case
Staphylococcus ..	3 „	*B. influenzae* ..	1 „

The various causes of death in the twenty-three fatal cases may be detailed thus:

Toxaemia	8 cases	Pericarditis ..	4 cases
Pneumococcal septicaemia	4 „	Spreading pneumonia	4 „
		Lung abscess ..	3 „

The causal organism in these fatal cases of empyema was the pneumococcus in twenty cases, the staphylococcus in two cases, and the *B. influenzae* in one case.

DRAINAGE BY CANNULA ASPIRATION

In fifty-two cases, or 14.9 per cent. of the total series, drainage of the empyema by means of a metal cannula was attempted.

A short silver cannula was inserted between the ribs into the pleural cavity and retained in position by means of gauze soaked in collodion, after the manner described by McNeil (1930). A rubber tube was then attached to the mouth of the cannula and clipped, and a thick pad of wool applied as a dressing. By means of a syringe attached to the tube, pus

was aspirated through the cannula once or twice daily until the discharge became very scanty, whereupon the cannula was removed and the small sinus was allowed to drain openly. After each aspiration the usual practice was to inject into the cavity a small quantity of iodoform in liquid paraffin.

The results of this method of treatment, so far as actual mortality was concerned, were more satisfactory than treatment by repeated aspiration, but the extremely protracted convalescence associated with this procedure must detract from its success. The average length of stay in hospital from the commencement of the cannula drainage was 14.4 weeks, a figure which compares unfavourably with other methods of treatment. Furthermore, in nine cases cannula drainage proved inadequate, and after a long illness recourse to open operation became necessary to empty the cavity completely.

TABLE II.—*Showing the Results of Treatment by Cannula Aspiration*

Age	Cases	Recoveries	Deaths	Mortality per cent.
Under 2 years ..	21	13	8	38.1
2–5 years	20	16	4	20.0
5–12 years	11	11	0	Nil
Totals	52	40	12	23.0

It will be observed from Table II that cannula aspiration proved more successful in empyema of infancy than treatment by repeated aspiration, and on this account alone it is certainly worthy of consideration. The infecting organism was the pneumococcus in forty-nine cases of this group, the staphylococcus in two, and the streptococcus in one case respectively. The causes of death in those who failed to survive were as follows:

Toxaemia .. .. 7 cases	Spreading pneumonia 1 case
Pericarditis .. .. 2 „	Scarlet fever .. .. 1 „
Pneumococcal septicaemia 1 case	

Of the twelve fatal cases, the infection was due to the pneumococcus in eleven, the remaining case being one of streptococcal empyema.

DRAINAGE BY CLOSED SUCTION

This type of drainage was employed in only fourteen cases of the series, and it is therefore difficult to assess its true value in the scheme of treatment. For the sake of completeness, however, it is advisable that reference should be made to it. The technique usually consisted in making a small intercostal incision through which a rubber drainage tube was thrust into the pleural cavity. Suction was then applied to the tube by means of a Politzer bag or Bunsen bottles, the bag being favoured in the majority of cases.

Unfortunately it cannot be claimed that the results of this method of closed suction drainage were encouraging, although, as previously stated, the number of cases in which it was employed was too small to allow of any definite conclusion being reached regarding its efficacy. As was the case with other types of conservative treatment, the main difficulty was the maintaining of adequate drainage for a period long enough to ensure thorough emptying of the cavity, and in two instances open operation was ultimately required owing to the closed suction having proved quite inadequate to influence the size of the effusion seriously. Of the fourteen cases belonging to this group the infection was due to the pneumococcus in ten, the staphylococcus in three, and the streptococcus in one case. The results obtained are shown in Table III.

TABLE III.—*Showing the Results of Treatment by Closed Suction Drainage*

Age	Cases	Recoveries	Deaths	Mortality per cent.
Under 2 years ..	3	0	3	100.0
2–5 years	7	6	1	14.3
5–12 years	4	4	0	Nil
Totals	14	10	4	28.6

The average length of stay in hospital of the cases treated by closed suction drainage was 8.7 weeks from the beginning of treatment of the empyema. Of those who failed to survive, the cause of death was stated to be spreading pneumonia (two cases) and pneumococcal septicaemia (two cases).

Radical Treatment

Reference will now be made to those cases of empyema which were subjected to a more radical form of pleural drainage than has so far been described. In this group open operation was performed in every instance, the adherents of this regime being of the opinion that only by such heroic measures will free and adequate drainage of the pleural cavity be assured in children with empyema. When considering this group of cases it is important to bear in mind one significant fact—namely, that operation was never undertaken wittingly during the synpneumonic phase of the illness. If the diagnosis of empyema was made in the early stages, aspiration of the thorax was repeated until the pus became thick and localized, and immediate operation on admission to hospital was only performed when the history indicated that the disease was of long standing and exploratory puncture yielded thick pus. In the large majority of cases treated by open operation resection of a portion of rib was considered desirable, but in a small proportion open drainage was attempted without resorting to rib resection, and it will perhaps be of interest to consider these latter cases separately.

THORACOTOMY AND OPEN DRAINAGE

This method consisted in making a free incision in the intercostal space, incising the pleura, and, in some cases, aiding the evacuation of the pus and fibrin clots by means of a suction apparatus. Thereafter, a rubber drainage tube was inserted in the opening, and the cavity was allowed to drain on to the surface without suction. The results obtained in the thirty-seven cases in which this mode of treatment was employed are summarized in Table IV.

TABLE IV.—*Showing the Results of Treatment by Thoracotomy and Open Drainage*

Age	Cases	Recoveries	Deaths	Mortality per cent.
Under 2 years ..	7	1	6	85.7
2–5 years	20	16	4	20.0
5–12 years	10	9	1	10.0
Totals	37	26	11	29.7

It will be noted that the effects of this procedure in empyema of infancy were somewhat disastrous, since only one of the cases at this early age survived. The major difficulty associated with this method was the maintenance of free drainage from the pleural cavity, since the space available between the ribs was rarely found to be

of sufficient width to allow of the insertion and retention of a wide-bore tube. This difficulty, most pronounced in infants and very young children, was largely responsible for this mode of treatment being abandoned as unsatisfactory, and it is now never used in any circumstances.

The average length of stay in hospital following operation in this group was 8.2 weeks, and in the eleven patients who failed to survive the causes of death were as follows:

Toxaemia	7 cases
Pneumococcal septicaemia	2 ,,
Spreading pneumonia	2 ,,

The infecting organism was the pneumococcus in thirty-three and the streptococcus in the remaining four cases. The organism isolated in all the fatal cases was the pneumococcus.

DRAINAGE BY RESECTION OF RIB

Rib resection was performed in 185 cases of the series, which represents 53.2 per cent. of the total. Two distinct varieties of post-operative drainage were employed, according to the preference of the individual surgeon, and it will perhaps be profitable to consider each of these procedures separately.

(*a*) *Rib Resection with Closed Suction Drainage.*—This type of drainage was favoured in seventy-three cases, and consisted in careful closure of the operation wound round a rubber drainage tube, to which was applied a suction apparatus in the form of Bunsen bottles or a Politzer bag. Continuous closed suction was usually maintained in this manner for about one week following operation, and thereafter the sinus was allowed to drain openly. The results are summarized in Table V.

TABLE V.—*Showing the Results of Treatment by Rib Resection and Closed Suction Drainage*

Age	Cases	Recoveries	Deaths	Mortality per cent.
Under 2 years	11	8	3	27.3
2–5 years	38	34	4	10.5
5–12 years	24	23	1	4.2
Totals	73	65	8	11.0

It will be noted from these figures that the immediate results of treatment by rib resection and closed suction drainage compare favourably with the other methods of treatment already described. Furthermore, this procedure had the added advantage that convalescence was relatively short, the average duration of stay in hospital following operation being only five weeks. The infecting organism in these cases was the pneumococcus in sixty-seven, the streptococcus in three, and the staphylococcus in three.

The various causes of death in the eight patients who failed to survive in this group were as follows:

Toxaemia	4 cases	Pericarditis	1 case
Pneumococcal peritonitis	2 ,,	Pneumococcal septicaemia	1 ,,

The empyema was pneumococcal in origin in all the fatal cases.

(*b*) *Rib Resection with Open Drainage.*—Open drainage following rib resection was employed in 112 cases of empyema. The technique consisted in inserting a rubber tube or portion of a rubber dam into the operation wound and allowing the pus to drain on to the surface unaided by suction. The results obtained are detailed in Table VI.

TABLE VI.—*Showing the Results of Treatment by Rib Resection with Open Drainage*

Age	Cases	Recoveries	Deaths	Mortality per cent.
Under 2 years	17	13	4	23.5
2–5 years	58	50	8	13.8
5–12 years	37	36	1	2.7
Totals	112	99	13	11.6

Study of the above table reveals that this mode of drainage yielded results very similar to those obtained by rib resection with closed suction drainage, and it is probable that the slight variations in the mortality rates at the various ages are not in any way significant. The average duration of convalescence following operation was also very similar to that in the preceding group—namely, 5.5 weeks. The causal organism was found to be the pneumococcus in 102 cases, the streptococcus in six cases, and the staphylococcus in four cases.

The causes of death following rib resection and open drainage were as follows:

Toxaemia	4 cases	Pericarditis	1 case
Pneumococcal septicaemia	4 ,,	Intrathoracic haemorrhage	1 ,,
Peritonitis	2 ,,	Dysentery	1 ,,

The pneumococcus was isolated in twelve of the fatal cases, and in the remaining case the infection was due to the streptococcus.

Conservative and Radical Measures Compared

The more important methods which are regularly practised in the treatment of empyema in children have been considered individually, and it may be instructive at this juncture to view the subject from a wider angle. For this purpose it is proposed to group the various procedures adopted under two main headings—namely, conservative and radical—since the choice between these two types of treatment would seem to be the major point at issue in the management of the child with empyema. Under the heading of "conservative treatment" are included those cases treated by repeated aspiration, cannula aspiration, and closed suction, whereas "radical treatment" includes thoracotomy with open drainage and rib resection.

In Table VII the results of these two forms of treatment are compared at each age group, since it has been clearly shown that the success or failure of any procedure which may be adopted in empyema is determined to a great extent by the age of the child.

TABLE VII.—*Contrasting the Results of Conservative and Radical Treatment*

Age	Conservative		Radical	
	Cases	Mortality per cent.	Cases	Mortality per cent.
Under 2 years	54	57.4	35	37.1
2–5 years	49	16.3	116	13.8
5–12 years	23	Nil	71	4.2
Totals	126	30.9	222	14.9

This comparison of results is of interest, since the figures indicate quite clearly that in this series of cases radical measures proved more successful than conservative in infancy and early childhood, and the general mortality resulting from conservative measures was approximately double that which occurred in the operation cases.

Considerable divergence of opinion is found in the literature on this subject.

Michalowicz (1935) found that conservative treatment of empyema was attended with a lower mortality than operation at all ages, whereas Steinke (1935) concluded that rib resection gave a lower mortality than any other form of treatment. Brown (1923) reported that his mortality rate with rib resection was 21.5 per cent., as compared with a mortality of 40.3 per cent. in cases treated by intercostal drainage. Rienhoff and Davison (1928) believe that in infants under 2 years of age rib resection and open drainage will yield the best results, and express the opinion that the younger the patient and the poorer his condition the more important it is to establish free drainage.

To facilitate comparison with figures concerning the mortality at various ages published from other centres Table VIII has been prepared. This shows the number

TABLE VIII.—*Showing Mortality according to Age for the Total Series*

Age	Cases	Recoveries	Deaths	Mortality per cent.
Under 2 years ..	103	45	58	56.3
2–5 years	165	141	24	14.5
5–12 years	95	91	4	4.2
Totals	363	277	*86	23.7

* 15 of these patients died within forty-eight hours of admission to hospital.

of deaths and the mortality rate at the three age groups for the total series, irrespective of the mode of treatment. In this table are included, for the sake of completeness, fifteen patients who were admitted to hospital *in extremis* and who died within forty-eight hours of admission. As previously stated, these cases have been omitted from the foregoing sections dealing with the treatment of empyema because their precarious condition precluded any serious attempt being made to drain the pleural cavity. In fact, in eight of these cases the diagnosis of empyema was not established until necropsy.

Commentary

When an attempt is made to assess the relative merits of different forms of treatment in any disease pitfalls are apt to be encountered which certainly do not facilitate reliable conclusions being reached. In such a condition as empyema in children, where several factors may complicate the issue in each individual case, the temptation is great to eschew all dogmatism concerning treatment and to fall back on the vague generality that every case must be treated on its own merits. An attitude such as this may be safe, but it is singularly negative and unhelpful, and the purpose of this investigation was to discover, if possible, a definite answer to the question, What is the most satisfactory method of treating empyema in children? It is almost certainly true to say that the ideal treatment of empyema has not as yet been evolved, and that no finality has been reached regarding this important problem. Nevertheless, it is desirable that methods in common use to-day should be reviewed from time to time, thus enabling us to take stock of the situation and clarify our outlook.

A discussion on the treatment of empyema in children based on the study of a fairly large series of cases over a period of years is open to certain objections, but it is probably the best means at our disposal of obtaining reliable evidence. In this study it has been possible to contrast different forms of treatment, and although it would be unwise to draw any rigid conclusions, certain points which arise from this investigation are perhaps worthy of note. The fundamental choice that has to be made regarding the treatment of a child with empyema must lie between conservative measures on the one hand and radical or surgical measures on the other, and the trend in some centres to-day would appear to be towards the conservative treatment of empyema because of its supposed freedom from risk as compared with more drastic operative procedures. It will be evident that the findings in this investigation do not lend support to such an attitude, but rather suggest that the most successful treatment of empyema in children of all ages consists in free drainage of the pleural cavity by means of rib resection. As has been indicated, recovery will occur with such measures as repeated aspiration and cannula aspiration alone, but it will not occur so frequently and so rapidly, and there is always the possible contingency that after enduring a long and exhausting illness the child will, in the end, have to face the added ordeal of operation. It is now generally accepted that before the operation of rib resection is undertaken in empyema the child must be suitably prepared and, except in chronic cases, preliminary localization of the effusion by means of aspiration is of vital importance. Thus a skilful blending of conservative and radical procedures, the one being complementary to the other, would appear to be the method of choice at the present time, provided that operation is performed at the earliest moment compatible with safety. The mode of drainage following rib resection does not appear to be of serious import, although the evidence awards a slight advantage to closed suction.

In the foregoing pages I have dealt only with the immediate results of treatment of empyema in children, since it has not been possible to obtain a sufficiency of reliable data regarding such important details as lung expansion and time of complete closure of the sinus. Such evidence as is available, however, seems to indicate that the later effects of rib resection in children will bear comparison with any of the alternative procedures described.

To conclude, it may be stated that ultimate rib resection with free drainage of the pleural cavity would seem to be the safest and most expeditious means of treating empyema in children of all ages. Conservative measures, such as repeated aspiration of the thorax, are of great value as a preliminary to radical operation, but, except where the pus is very small in amount, to attempt a cure by these measures alone is merely to prolong the illness unnecessarily, and may even endanger life.

Summary

A review is presented of the several types of treatment employed in a series of cases of empyema in children occurring during a period of fifteen years. It is revealed that the success or failure of any form of treatment is governed to a large extent by the age of the child, the mortality reaching a very high level during infancy.

The immediate effects of treatment by purely conservative measures are discussed, and these are contrasted with the results obtained by more radical procedures. It is apparent that, in those relatively few cases where the pus is very small in amount, cure can be effected without risk by conservative measures alone.

In this series of cases the most successful method of treatment proved to be the operation of rib resection, performed immediately after localization of the empyema had been achieved by means of repeated aspiration. The mortality following this procedure was only 11.4 per cent., a figure which compares very favourably with that of

other forms of treatment. Furthermore, the period of convalescence was found to be relatively short.

The manner of drainage following rib resection did not appear to have any significant influence on the mortality, since a striking similarity was observed in the immediate effects of both closed suction and open drainage.

The causal organism was proved to be the pneumococcus in 90 per cent. of the cases in the series, the infection in the remainder being due either to the streptococcus or to the staphylococcus. The immediate results of treatment were not significantly influenced by the nature of the infecting organism.

I wish to record my thanks to the physicians and surgeons of the Royal Edinburgh Hospital for Sick Children for allowing me free access to their case records of empyema.

REFERENCES

Brown, H. P. (1923). *Ann. Surg.*, **77**, 401.
McNeil, C. (1930). *Practitioner*, **125**, 219.
Michalowicz, M. (1935). *Rev. franç. Pédiat.*, **11**, 545.
Rienhoff, W. F., and Davison, W. C. (1928). *Arch. Surg.*, **17**, 676.
Steinke, C. R. (1935). *Ann. Surg.*, **101**, 617.

SYNERGY IN EXPERIMENTAL CHEMOTHERAPY OF STAPHYLOCOCCAL INFECTIONS

BY

S. P. DE, M.B.

AND

U. P. BASU, D.Sc.

(From the Bengal Immunity Research Laboratory, Calcutta)

Since the observation of Tréfouël *et al.* (1935) that the therapeutic activity of the hydrochloride of 4-sulphonamido-2:4-diamino-azo-benzol is due to the parent compound *p*-aminobenzenesulphonamide itself, a considerable number of papers have been published referring to the use of this drug in the treatment of certain human infections of coccal origin in general and that caused by haemolytic streptococci in particular. But in spite of these extensive investigations very little work has yet been carried out on the efficacy of this newly discovered drug in staphylococcal infection. Of the literature which has special reference to its use in such infection the observations of Troisier *et al.* (1937) and Thiers *et al.* (1937), as well as that of Frank (1937), need only be mentioned. The latter is again significant from the fact that the drug used was *p*-aminobenzenesulphonamide. A knowledge of the protective action of this drug against staphylococcal infections seems now to be of considerable interest, as this coccus is also responsible for the development of virulent toxin in human beings.

Accordingly a *Staphylococcus aureus* (local) strain was chosen and its toxicity was first ascertained. The strain after eighteen hours' culture in broth was noticed to be lethal within twelve hours of infection for white mice, weighing from 10 to 12 grammes (the type of animals used for subsequent experiments), in doses varying from 0.1 to 0.15 c.cm. (each cubic centimetre containing about 1,000 million organisms).

The Experiments

In a preliminary experiment nine mice were infected intraperitoneally with approximately five minimal lethal doses of the above strain. Six of the mice were given within half an hour 7.5 mg. of *p*-aminobenzenesulphonamide in a sterile aqueous solution by the subcutaneous route. In order that no untoward symptoms might develop, as noticed in our previous experiments (De and Basu, 1937), a freshly prepared solution of the drug was always used. The remaining three mice received no treatment, and served as controls. The animals were then kept under observation, when all the latter animals were found to die within twenty-four hours, and only two of the former (treated) group survived after a period of seventy-two hours.

Thus the drug seems to possess no specific protective action, and consequently it was considered to be of importance to investigate the relative efficacy of *p*-aminobenzenesulphonamide and of a potent specific anti-staphylococcus serum. For this a staphylococcus antitoxic serum containing 600 international units per c.cm. and a sample of antibacterial serum were selected from the stock, and 50 units of the former and 0.5 c.cm. of the latter were injected into each animal after dilution with normal saline. Forty-eight mice of average weight—10 to 12 grammes—were taken and divided into four groups of twelve each.

Group A.—These were infected intraperitoneally with 0.5 c.cm. of broth culture of the above local strain. They received no treatment, and served as controls.

Group B.—Each of these animals was given intraperitoneally 50 units of antitoxic and 0.5 c.cm. of antibacterial serum, diluted with normal saline, and after half an hour was infected with 0.5 c.cm. of the broth culture.

Group C.—The animals were first treated with 3.5 mg. of *p*-aminobenzenesulphonamide in sterile aqueous solution; three hours later they were infected with 0.5 c.cm. of the culture, and 4 mg. of the drug was again administered after three hours of this infection.

Group D.—This group of animals were given a combination of the treatment used in Groups B and C. Thus each animal was injected with 3.5 mg. of the drug, and after two and a half hours 50 units of the antitoxic and 0.5 c.cm. of antibacterial serum diluted with normal saline were administered. Within half an hour it was infected with 0.5 c.cm. of the culture, and was again given 4 mg. of the sulphonamide after three hours of this infection.

All the animals were kept under observation over a period of ninety-six hours, and a post-mortem examination of those which died was made to find out the cause of death. The table below gives the results of these investigations.

	Hours				Necropsy and Blood Culture Report of the Dead Mice
	24	48	72	96	
Group A	All dead	—	—	—	*Staph. aureus*
Group B	8 Dead 4 Alive	1 Dead 3 Alive	— 3 Alive	— 3 Alive	"
Group C	2 Dead 10 Alive	4 Dead 6 Alive	2 Dead 4 Alive	— 4 Alive	"
Group D	All alive	All alive	All alive	All alive	—

Average weight of mice, 10 to 12 grammes. Nature of strain, *Staph. aureus* (local). Number of organisms, $1{,}000^6$ (18 hours' broth culture) per c.cm. Infection dose, 0.5 c.cm.

Next, to find out whether *p*-aminobenzenesulphonamide possesses any bacteriostatic action *in vitro* upon broth cultures of *Staph. aureus*, different amounts of the drug varying from 0.25 to 7.5 mg. were added to 10 c.cm. of the broth cultures and left in an incubator for eighteen hours. No inhibition of growth was noticed in any of

the tubes, thereby indicating that the compound even in a concentration of 1 in 1,333 has no bacteriostatic action.

Discussion

From the table it is evident that *p*-aminobenzenesulphonamide when administered in the doses used in this investigation is capable of prolonging and in some cases of saving the lives of mice infected intraperitoneally with a strain of *Staph. aureus*. Thus four out of twelve mice (Group C), or 33 per cent., were found to survive; while 50 per cent. were alive up to forty-eight hours and 80 per cent. up to twenty-four hours after the infection. A similar treatment with the combined antitoxic and antibacterial serum (Group B) shows a 25 per cent. survival among the infected animals. It appears, therefore, that in the relative doses employed in the present investigation the efficacy of *p*-aminobenzenesulphonamide is slightly greater than that of the specific serum. The data from Group D again point to the fact that much better therapeutic results may be obtained by a combination of serum and drug, as under this condition a 100 per cent. survival among the infected animals occurred. But as the drug has no bacteriostatic action in culture media, it would now be of additional interest to discover the mode of action of the drug *in vivo*, particularly as a combined chemotherapeutic and biological treatment has been found to be far more efficacious against staphylococcal infections in mice. Work in this direction is already in progress.

Conclusion

From the preliminary experiments it would be unwise to make any definite conclusions. It may, however, be said that the subcutaneous administration of *p*-aminobenzenesulphonamide is capable of prolonging and in some cases of preserving the lives of mice infected with staphylococci. A better protection against staphylococcal infections in mice is obtained by combination of serum and the drug treatment.

REFERENCES

De, S. P., and Basu, U. P. (1937). *Indian J. med. Res.*, **25**, 467.
Frank, L. (1937). *Budapest Orvosiujság*, **35**, 415.
Thiers, H., Girard, M., and Jeune, M. (1937). *J. Méd. Lyon*, **18**, 247.
Tréfouël, J. and Mme, Nitti, F., and Bovet, D. (1935). *C. R. Soc. Biol.*, Paris, **120**, 756.
Troisier, J., Bariéty, M., and Lesobre, R. (1937). *Bull. Mém. Soc. méd. Hôp. Paris*, **53**, 441.

The second of the series of leaflets issued by the Department of Scientific and Industrial Research describing standard methods for the detection of toxic gases in industry deals with hydrogen cyanide vapour. It is pointed out that the danger of the absorption of this gas through the skin is intensified by the presence of sweat or other fluid: it may also be introduced into the body by inhalation. Slight symptoms of prussic acid poisoning will be noticeable after several hours' exposure to a concentration of 1 part in 50,000, while a concentration of 1 part in 500 will be fatal. The faint almond-like smell is quite easily missed, and is therefore useless as a method of detection. A sample of the suspected atmosphere should be drawn by a hand exhausting pump through a piece of specially prepared test paper impregnated with Congo-red–silver nitrate or benzidine–copper acetate. Two charts are supplied with the pamphlet to show the colorimetric reactions with various concentrations, and in this way a sufficiently dependable index to the relative safety of the atmosphere can quickly be obtained. It is remarked that this test will not indicate the danger in cases in which the oxygen content of a closed chamber is dangerously deficient. The price of the leaflet is 5s. 6d., owing to the high cost of reproduction of the colorimetric charts. It is obtainable from H.M. Stationery Office, Kingsway, W.C.2.

DAYLIGHT IN RELATION TO CLIMATE AND HEALTH*

BY

W. R. G. ATKINS, Sc.D., F.R.S.

Head of the Department of General Physiology, Marine Biological Laboratory, Plymouth

Daylight is derived from the radiation of the sun as modified by the interposition of the earth's atmosphere, and is perceived by the eye. Much of the sun's radiation is not thus perceived, but on account of its other effects may be properly considered here.

Measurements have been made of the radiation from the sun, throughout the whole spectrum, by Dr. C. G. Abbot and his co-workers at the Observatories of the Smithsonian Institution of Washington. When extrapolated to its value outside the earth's atmosphere what is termed the solar constant of radiation, as received on a surface set normally to the sun's rays, is 1,940 calories a square centimetre a minute, the scale of radiation being that of the Smithsonian Institution of 1913. For the sake of uniformity, measurements continue to be given on this scale, but the latest results of Abbot and Aldrich lead to a value which is 2.3 per cent. less, and closer to the Angström scale, and agrees to one part in a thousand with that of the British National Physical Laboratory (Guild).

The value given for the solar constant of radiation relates to the mean distance of the earth from the sun. The earth is closest early in January and furthest away early in July. The variation in the square of the solar distance causes a 6.6 per cent. increase in January as compared with July. The solar constant, however, undergoes irregular fluctuations and periodic variations, which usually amount to about 2 per cent. but may be as much as 8 per cent. of its mean value. These are probably of great importance for the climate of the earth.

Abbot, Fowle, and Aldrich determined the relative energy at various wave-lengths for pure sunlight. These results have been extrapolated to give the curve outside the atmosphere, and the fraction transmitted and received normally is given in Table I, as calculated with the sun vertically overhead at each station. Fig. 1 has been constructed with the help of these data. Wave-lengths are

TABLE I.—*Solar Energy—Spectrum (Abbot)*

Wave-length	Mean intensity in Arbitrary Units, k	Transmission, Fraction of Column 2	
		Washington	Mt. Whitney
μ 0.39	3,614	0.445	0.800
0.43	5,321	0.600	0.844
0.45	6,027	0.640	0.875
0.47	*6,240*	0.671	0.902
0.50	6,062	0.705	0.919
0.55	5,623	0.739	0.930
0.60	5,042	0.760	0.940
0.70	3,644	0.839	0.964
0.80	2,665	0.865	*0.976*
1.00	1,657	0.901	0.975
1.60	532	*0.930*	0.963
2.50	43	0.870	0.945

* Read in the Section of Physiology and Biochemistry at the Annual Meeting of the British Medical Association, Plymouth, 1938.

given here in microns (millionths of a metre, symbol μ) or in millimicrons ($m\mu$).

To compute the transmission for other than a vertical sun—namely, zero zenith distance—the coefficients given in Table I must be raised to a power equal to the secant of the zenith distance, for the path of the light through the atmosphere is proportional to this. The results are shown in Fig. 2. With a declining sun the more oblique path of the rays results in the almost complete cutting off of the shortest wave-lengths; this effect is often greatly enhanced by the presence of mist or dust, so that a low sun may appear a fiery red.

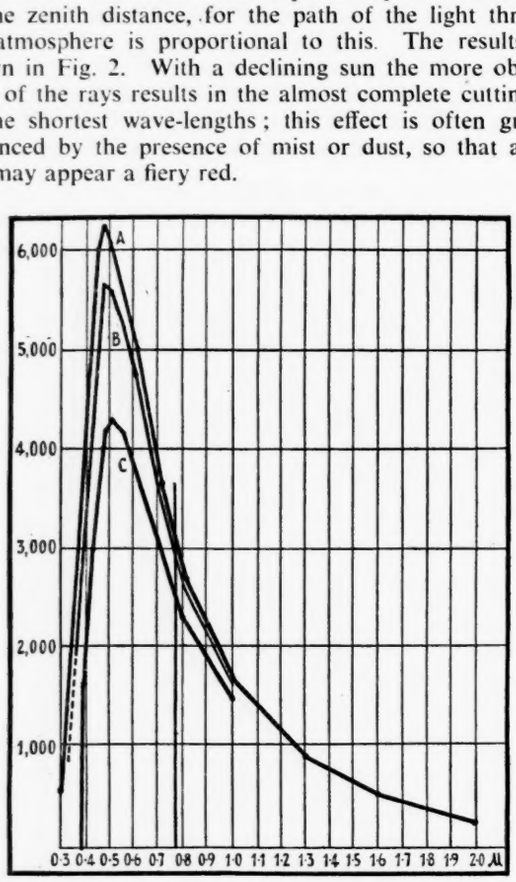


FIG. 1.—The ordinates denote arbitrary energy units, k_λ, and the abscissae wave-lengths. The curves A, B, and C refer, respectively, to outside the atmosphere, Mt. Whitney, and Washington, and relate to zenithal sunlight received at normal incidence. The vertical lines denote the approximate limits of visible radiation.

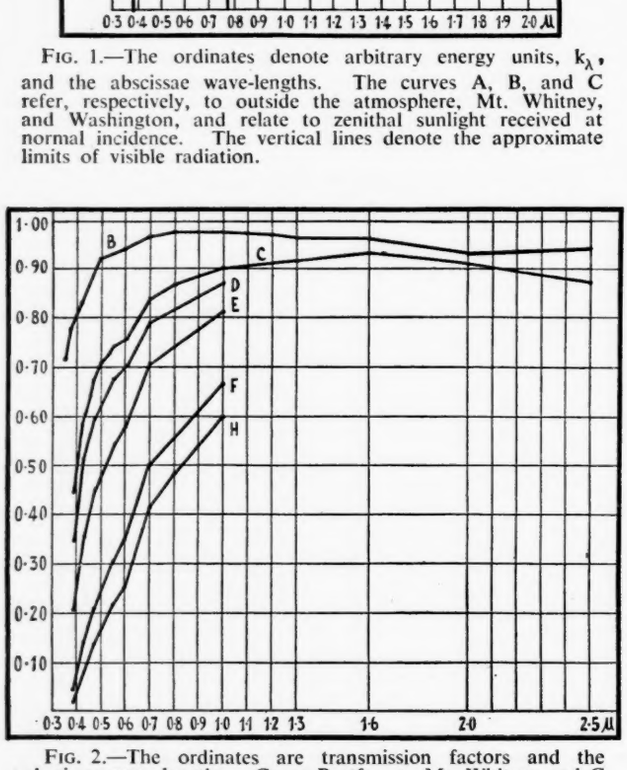


FIG. 2.—The ordinates are transmission factors and the abscissae wave-lengths. Curve B refers to Mt. Whitney and C to Washington at zero zenith distance. Curves D, E, F, H refer to Washington at zenith distances 40, 60, 75, and 78.5 degrees.

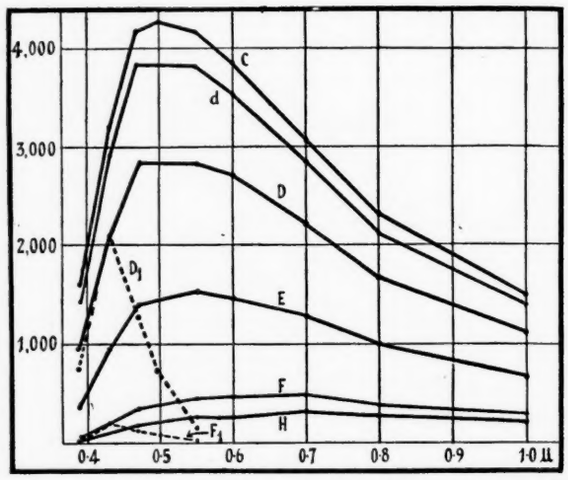


FIG. 3.—Values of $k_\lambda f^{\sec z} \cos z$ plotted against wave-lengths, for Washington at zenith distances 0, 20, 40, 60, 75, and 78.5 for curves C, d, D, E, F, and H respectively. Dotted lines: using factors for potassium photo-electric cell.

In Fig. 3 the arbitrary energy units are taken as ordinates, and k_λ is multiplied by $f^{\sec z}$ to allow for the additional atmospheric distance traversed for different values of z, the zenith distance; the expression is then multiplied by $\cos z$ to correct to incidence upon a horizontal surface. The curves then are $k_\lambda f^{\sec z} \cos z$ and relate to Washington. For Plymouth, latitude 50 degrees, $z = 40$ degrees at noon on April 16 and August 21; $z = 60$ degrees at noon on February 23 and October 18, and $z = 75$ degrees approximately at noon on December 22; at 10 a.m. and 2 p.m. on December 17 to 27 inclusive $z = 78.5$.

It may be seen that in curves A, B, and C, Fig. 1, the maximum lies at 0.47, 0.47, and 0.50 $m\mu$ respectively, and in Fig. 3 the maximum becomes flattened and shifted towards longer wave-lengths, so that in E the maximum is at 0.55 in the green, and lies in the deep red at about 0.7 μ with $z = 75$ degrees. There is therefore in the course of the year a shift in the maximum from red to blue and back again.

The extra-atmospheric solar radiation may be thus divided between the limits 0.3 and 3.0 μ: ultra-violet 0.3 to 0.4 μ, 6.6 per cent.; visible 0.4 to 0.76 μ, 52 per cent.; infra-red 0.76 to 3.0 μ, 41.3 per cent. There is radiation of longer wave-length, stopped by glass but transmitted by certain crystals, also radiation of shorter wave-length about which we know little, as its absorption by oxygen in the upper air causes a very abrupt falling off. According to the work of Fabry and Buisson, under the best conditions in the South of France the relative intensities in sunlight are as follows:

TABLE II

In $m\mu$	Relative Intensities
314	22,400
299	1,320
292	22
290	0.02

Diffuse Daylight

As sunlight passes through the atmosphere certain wave-lengths are absorbed and their energy used up in effecting a chemical change, as in the production of ozone from oxygen. Much of it is scattered and reflected. Droplets of water, relatively large as compared with the wave-length of light, scatter and reflect all wave-lengths; thus a cloud directly illuminated by the sun is white, as is also a sea fog. The reflection of light from a cloud is very

high ; according to Aldrich it amounts to 78 per cent., as observed from a balloon above a level layer. According to calculations made for the whole of the earth's surface no less than 43 per cent. of the total incoming solar radiation is reflected by clouds (Simpson).

But scattering by particles, small relative to the wave-lengths of light, affects the radiation inversely as the fourth power of the wave-length. Thus light of wave-length 0.38 μ, which is taken as being the extreme limit of the visible violet, is scattered sixteen times as much as light of 0.76 μ, the extreme limit of the visible red. So the scattered light, some of which reaches the earth, is relatively richer in blue, violet, and ultra-violet as compared with sunlight. Thus the unclouded sky looks blue.

Measurements of the energy of a source as a whole may be made with electrical instruments having blackened receiving surfaces, so that energy of all wave-lengths is almost totally absorbed. Of these instruments thermopiles are the most widely used, but bolometers, in which a change in resistance is produced by the energy absorbed, have found useful applications. By reducing the dimensions, and so the heat capacity, of both bolometers and thermopiles, a high sensitivity and a quick response have been produced. By placing the receiving surfaces in a spectrum, or by using light filters with due precautions, measurements can be carried out upon portions of the spectrum. But for comparative measurements in certain portions of the spectrum photo-electric cells have advantages, inasmuch as they have an instantaneous response, a high sensitivity, and a relatively low cost, coupled with a certain degree of wave-length selectivity, which can be rendered more highly selective by means of filters. Photo-electric cells serve to compare radiation received on a horizontal plane surface from sun plus sky, and from sky alone, when direct sunlight has been shaded off. The cells should be covered with a diffusing disk of opal-flashed glass, and colour filters, if used, should be placed below this. The spectral sensitiveness of several types of photo-cell are shown in Fig. 4 (Atkins and Poole), in which is

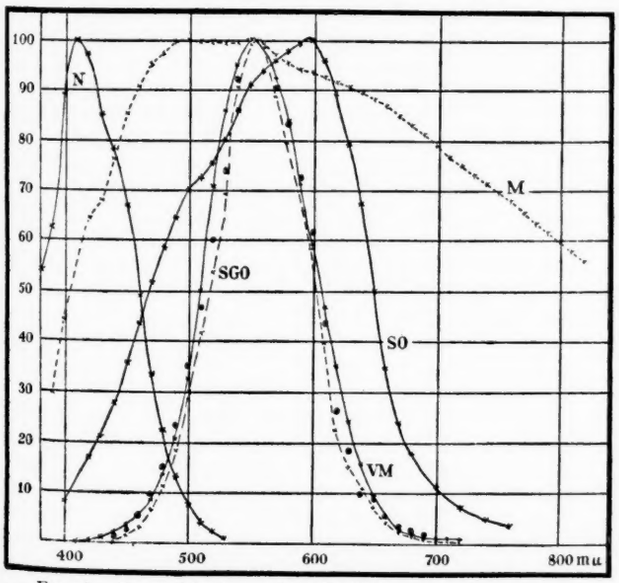


FIG. 4.—Curve M shows the distribution of energy in mean noon sunlight as a percentage of the maximum, and all sensitivities relate to this spectral energy distribution. N denotes vacuum sodium cell under opal. SO denotes selenium cell under opal. SG denotes selenium cell under special green filter; as this lies so close to the VM and SGO curves it has been omitted, but is denoted by the crossed circles; SGO shows the foregoing under opal, taking into account that the filter is now traversed by oblique light. VM denotes the international relative visibility factor of the eye, as for mean noon sunlight.

also shown the spectral sensitivity curve for the light-adapted human eye. This is not very different from that of the selenium rectifier photo-cell, and may be closely matched by the latter under a special greenish filter. The sodium cell, on the other hand, is most sensitive in sunlight—around 0.41 μ where the eye is of low sensitivity. It has been shown, however, that for mixed sunlight, white clouds, and blue sky the ratio of the readings of a sodium to those of a selenium cell remains nearly constant over a wide range of intensities ; but atmospheric conditions exist under which a considerable divergence becomes manifest.

The difference between sunlight and sky light may be seen from the following. At noon on May 26, in Dublin, the blue light from sunlight was only 1.28 times as intense as that from the sky. That for yellow was 5.4 times and for red 6.2 times as intense. In the anti-rachitic ultra-violet of sunlight (namely, from 313 mμ to the extreme limit received, about 297 mμ—frequently longer and rarely shorter in appreciable amount) Dorno has shown that the radiation from the whole sky exceeds that from the sun unless the altitude of the latter exceeds 45 degrees.

The Daylight Factor

When considering diffuse daylight the most useful index of the illumination in a room is the "daylight factor." It was shown by Paterson and Walsh that in absence of sunlight the illumination at a point inside a building bears a very nearly constant ratio to the illumination at a point outside, the receiving surface being set horizontally in each case. This percentage ratio is termed the "daylight factor." Owing to the great intensity of sky light, situations with a factor of 1 per cent. are adequately lighted for reading throughout the greater part of the day: even immediately inside large north windows the daylight factor is only about 6 to 16 per cent. Photo-electric cells serve well for such determinations ; if the sun is shining its rays should be screened off from the open-air photometer, or a correction be applied by the determination of the sunlight/sky light ratio.

It is obvious that a person exposed in the open for six minutes in the middle of the day will receive far more light than when inside for ten hours with a 1 per cent. daylight factor. It is therefore uneconomical to fit glass transparent to ultra-violet light in windows other than those that receive direct sunlight, save in buildings specially constructed to admit a far larger proportion of sky light than is customary.

Daily and Seasonal Changes in Light

As the altitude of the sun increases, the illumination received upon a horizontal surface rises from about 700 metre candles (lux) at sunrise to about 90 kilolux for 45 degrees and 145 kilolux for 90 degrees altitude, with a clear sky (Atkins, Ball, and Poole). The illumination at various solar altitudes is shown in Fig. 5, as obtained by using a selenium rectifier cell, corrected for curvature of the intensity–current relation. The cell was standardized in artificial mean noon sunlight and, as previously shown, its scale is fairly close to that of the eye. With the sun at 90 degrees its rays are less scattered in reaching the earth and its incidence is normal. With the selenium cell, sensitive throughout the spectrum, the ratio of zenithal sunlight to sky light is usually between 4 and 8 ; whereas with a sodium cell, sensitive only to the blue end of the spectrum, the sun/sky ratio is about 2 to 4. The upper limits are far beyond what is found in England,

where the sun reaches an altitude of about 63 degrees in summer. Owing to the variation in the scattering of light of different wave-lengths the daily and seasonal changes are not the same for different portions of the spectrum.

An elaborate study of the alterations in the composition of daylight has been made by Ornstein, Eymers, Vermeulen, and Postma, measuring the energy in various narrow wave-length bands under different atmospheric conditions. By means of a sodium cell daily records

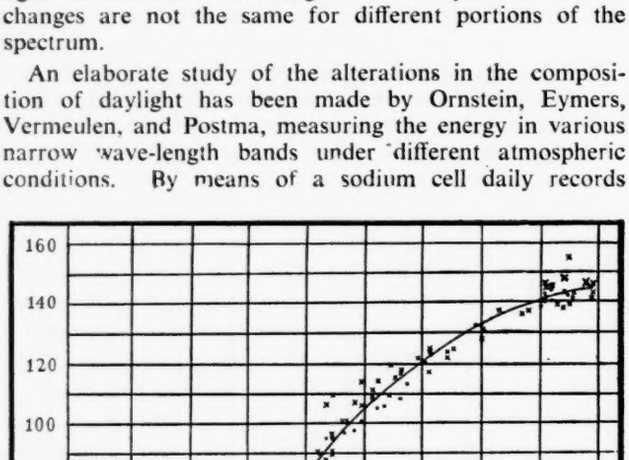


FIG. 5.—Vertical illumination at Colombo, for different altitudes of the sun, with clear sky or but few clouds. The ordinates denote vertical illumination in kilolux.

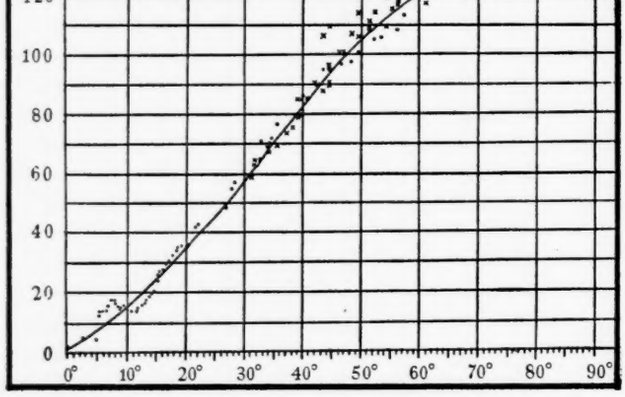


FIG. 6.—The ordinates denote percentages of the light received in each year, as measured in kilolux-hours.

have been obtained by the author for the last eight years at Plymouth, using a Cambridge Instrument Company "thread recorder." The records are of the blue-violet end, around 0.41μ, and by measuring the areas of the daily curves the total amount of light received has been found, expressed in kilolux-hours—namely, that received when an illumination of one kilolux persists for one hour. The daily illumination integral varied from 14.5 to 1,323 kilolux-hours, and the monthly means from 45.6 in December, 1934, to 781 in July, 1930, that year being exceptionally bright. For it the daily average was 414 kilolux-hours, but five other years averaged 309. In Plymouth the six summer months receive from three-quarters to four-fifths of the annual daylight; of this the brightest month—May, June, or July—receives 15 to 18 per cent. and December 1.5 per cent. (see Fig. 6).

The Physiological Effects of Daylight

The effects may be classified primarily under two headings:

(*a*) The Purely Photo-Chemical, in which the resultant action is proportional to the energy of the effective wave-length absorbed.—Thus when ergosterol is irradiated and thereby converted into vitamin D the action is purely chemical, and exact proportionality exists unless too great an intensity or time of exposure introduces a secondary destructive action.

(*b*) The Physiological Stimulation of Living Cells.—In this the effect decreases with time, which is a perfectly general result from the application of any stimulus. Thus the eye when exposed to bright light reduces its sensitivity first of all by decreasing the pupillary diameter. This, however, only decreases the area of the pupil to about one-fourth or one-fifth, approximately the variation between the illumination on a horizontal surface from full daylight and that from sky alone when the sun is obscured by a small cloud. There is then a slower diminution in sensitivity due to an alteration in the quantity of unbleached visual purple and to the variation in nervous response. A similar decrease in sensitivity is observed when the skin is subjected to the extreme solar ultra-violet, which appears to be almost the same in range as the antirachitic region.

The action of radiation takes place only where it is absorbed, so the effect of ultra-violet is primarily quite superficial; but a secondary result, such as increased calcification, may be found when the blood stream has carried away the activated products.

The major successes of light therapy appear to be the treatment of rickets, including tetany, of lupus and "surgical" tuberculosis, also of certain types of wound and ulcer. But on the healthy population the mental effect of bright daylight is so cheering that one is compelled to regard it as of significance for the body also, especially when—as usual in our land—it is a very variable stimulus.

In the treatment of tuberculosis and of wounds it appears that the whole solar radiation is effective, and not the ultra-violet only. The longer wave-lengths penetrate more deeply, the maximum penetration being that of the deep red and short infra-red, about 0.7 to 1.4 μ. The longer infra-red is so heavily absorbed by water that its penetration is less and its causation of superficial burning is greater, though erythema is produced by the ultra-violet below 313 mμ without contemporaneous sensation.

I am indebted to my brother, Lieutenant-Colonel R. R. G. Atkins, R.A.M.C., for a discussion on heat-stroke, commonly though less correctly termed sunstroke. Its incidence is mainly confined to tropical and semi-tropical regions where the small amount of water vapour in the atmosphere allows much infra-red to penetrate, and where a dry earth, especially a sandy or rocky situation, is heated by the sun; were the ground moist much of the solar energy would be expended in evaporation. Thus at Singapore, with the sun vertically overhead twice a year, heat-stroke is far less common than in the North-West Provinces of India and in Mesopotamia. Thick turbans and sun-helmets—especially those provided with thin aluminium foil as recommended by Crowden—serve to protect the head, but may fail unless the whole skin is acting efficiently as an evaporating and radiating surface. There are descriptions in Lawrence's *Seven Pillars of Wisdom* of the extreme conditions of

unmitigated sunlight, baked reflecting surfaces, and hot winds in which well-trained men can yet endure great muscular exertion and fatigue. But they eat sparingly and drink water of varying degrees of brackishness, which provides against salt depletion. Moreover, through long exposure their bodies are provided with larger skin capillaries than in the shielded bodies of Europeans. In erythema the surface capillaries become dilated, but with constant exposure, as on faces and hands, they become larger. No one can see the splendid general tone of the skin of those who take even short regular sun-baths on the sea front in Plymouth without realizing that an unsunned skin is unnatural and may consequently be expected to fail when extreme calls are made on its heat-regulating powers. The function of the skin in heat regulation may be considered as of prime importance to health, and we need probably look no further than a pure heat effect for the stimulation of the powers of the body resulting from exposure to sunlight, which is capable of raising the tissues to well above their normal temperature to a depth of over one centimetre, as shown by Sonne, also by Loewy and Dorno.

Figs. 4, 5, and 6 are reprinted from the *Proceedings of the Royal Society* by permission.

Clinical Memoranda

Volvulus of Pelvic Colon in a Young Person: An Unusual Complication of Appendicectomy

Volvulus of the pelvic colon rarely occurs in young people. L. E. C. Norbury in an article on left iliac fossa pain describes a personal case of a girl aged 25 in whom the gut twisted a second time almost exactly a year after the first occurrence. At her second operation the pelvic loop was resected after Paul's method. A definite degree of megacolon was present. Other cases are recorded complicating pregnancy and labour, including Jellinghaus's case following Caesarean section, though the age of the patient was 37. Foote records volvulus of the pelvic colon in a mentally deficient male aged 22. My case is of interest not only from the point of view of the youth of the patient but also because it presented itself as an acute obstruction on the ninth day after an otherwise uncomplicated appendicectomy.

Four months ago a domestic servant aged 20 was admitted and operated upon for an attack of acute appendicitis typical except for the lack of the initial central abdominal pain. Through a lower right paramedian incision an acutely inflamed appendix, stiffened with oedema and covered with lymph, was removed. The appendix was unperforated and the abdomen was closed without drainage and without exploration of any other viscus. Convalescence was normal in every way until the ninth day—that is, thirty-six hours before her proposed discharge from hospital. In the evening of that day she was seized with acute lower abdominal pain and had vomited some four times before I saw her five hours after the onset of the complication. She was obviously ill and distressed, with a subnormal temperature and a pulse rate of 116. Her tongue was furred and she had passed no flatus since the onset of the pain, though the morning bowel action had been regular since operation. The abdomen was tensely distended; this seemed to be most marked beneath the incision, which had by now healed. The rectum was empty and even somewhat ballooned.

Upon a diagnosis of acute intestinal obstruction, probably from rupture of the deeper layers of the wound, she was taken to the theatre and the original incision reopened. It was soundly healed, and the cause of the obstruction presented itself as the familiarly large loop of sigmoid colon. The bowel was decompressed with a trocar and cannula, and a twist of 180 degrees undone. The attachment of the mesocolon did not appear unduly narrow and no fixation was attempted. A long rectal tube was passed up to the splenic flexure and the peritoneum closed around a pelvic drain owing to the fact that free fluid was present in the peritoneal cavity. The bowels acted copiously on the table and regularly after operation. Peritoneal drainage was rather more copious than was expected and the peritoneal infection prevented an uninterrupted recovery. The patient was transferred to the country eleven days after her second operation, and she has remained symptom-free since then.

A radiograph of a barium enema taken after convalescence shows that the rectum and colon up to the splenic flexure are rather wider in calibre than normal and the haustrations are less well marked. A condition of megacolon is not present.

I am indebted to Mr. Eric Crook, on whose behalf I treated the case, for his help in the after-care following the second operation, and for his permission to submit these notes.

K. L. JAMES, M.S., F.R.C.S.,
London, W.C.2. Surgical Registrar, Charing Cross Hospital.

BIBLIOGRAPHY

Norbury, L. E. C. (1938). *Medical Treatment in General Practice*. **4**, 304.
Jellinghaus, C. (1932). *Zbl. Gynäk.*, **56**, 1289.
Foote, E. M. (1899). *Boston med. and surg. J.*, **140**, 233.

Cervical Pregnancy

I would like to bring to notice two recent cases of cervical pregnancy on account of their rarity.

Case 1.—On December 11, 1937, a patient was admitted with a history of four months' pregnancy. She was in a state of toxaemia, with face drawn and haggard, tongue coated brown and cracked, a pulse of 140, and a temperature of 103°. The bladder was distended, and the urine on removal was found to be fetid and dark in colour, containing traces of albumin, blood, and pus. The level of the uterus was to just below the umbilicus, and she was having violent contractions. Examination showed a globular swelling, pressing outside the vagina and obliterating it. A small dimple was visible about its centre, representing the cervix. The appearance was that of a typical haematoma. A longitudinal incision was made over the cervix, and a four-months foetus and placenta were removed. The placenta was found partly in the bulging cervix and partly in the uterus, and the whole foetus was in the cervix. The patient developed white-leg, was treated with prontosil and sulphonamide-P, and left the hospital well.

Case 2.—On December 21, 1937, this patient was admitted with a history of ten months' pregnancy. She was toxic and her tongue was furred; her pulse was 130 and temperature 102°. Her bladder was distended, and the urine on removal contained pus. On examination a large contracting uterus was found, and in place of a cervix a globular mass was felt, but no opening was apparent. With a speculum a small dimple was seen in the centre of the swelling. A Caesarean section was performed. The walls of the uterus were dark in colour, thickened, and almost fibrous in texture; there was no bleeding on cutting into the uterus. A large over-mature dead child was removed. The mucous membrane lining the uterus was thick and oedematous, and the membranes had to be peeled off. The placenta, dark and sodden, was found in the distended cervix down below. The uterus contracted fairly well, but owing to the septic condition of the walls of the uterus it was considered advisable to perform hysterectomy. This was done. An opening was made in the lower dilated portion of the cervix, and a tube was left in position, draining into the vagina. The patient was treated with prontosil and sulphonamide-P, and after a fairly stormy convalescence returned home well.

L. TARLETON, M.R.C.S., L.R.C.P.,
Jodhpur, India. Medical Superintendent, Jaswant Female Hospital.

Reviews

THE HYPOTHALAMUS

The Hypothalamus: Morphological, Functional, Clinical and Surgical Aspects. By W. E. Le Gros Clark, D.Sc., F.R.C.S., F.R.S., John Beattie, M.D., D.Sc., George Riddoch, M.D., F.R.C.P., and Norman M. Dott, F.R.C.S.Ed. Published for the William Ramsay Henderson Trust. (Pp. 212; over 100 illustrations. 12s. 6d.) Edinburgh: Oliver and Boyd. 1938.

This splendid monograph is based upon four lectures, now elaborated and brought up to date, which were delivered in 1936 under the auspices of the William Ramsay Henderson Trust. Each of the lecturers in his own sphere has long made a special study of the anatomical, physiological, clinical, or surgical problems presented by the hypothalamus—that tiny fraction (less than 1/250th) of the brain which is now known to exercise so profound an influence over the most fundamental of our bodily and psychic activities. There is surprisingly little overlapping in the lectures as now published, and when repetition has been unavoidable the different angle of approach merely corroborates some earlier observation and helps the reader to fix important facts in his memory without the tedium inevitably produced by simple reiteration. Furthermore, no attempt has been made to write a *big* book; the literary style is admirable throughout, for without wasting words the information gleaned from personal experience has been clearly set forth, and the involved problems have been referred to with the modesty and wisdom which characterize only those who appreciate the limitations of their knowledge.

Professor Le Gros Clark deals with the histological structure of the mammalian hypothalamus, and discusses the comparative anatomy of these parts in the lower vertebrates, finally contrasting the features in the lower forms with those found in the human brain. An extremely interesting section of this lecture deals with the rich blood supply to the hypothalamus, and the theory that the hypophysis may be functionally linked to the hypothalamus by a hypophyseo-portal system of blood vessels is thoroughly considered, though it seems to be impossible at present to arrive at a definite conclusion on this matter.

The functional aspects of the hypothalamus are reviewed by Dr. John Beattie, who puts forward his reasons for regarding the hypothalamus as having a dual mechanism, one part activating the parasympathetic and the other the sympathetic portion of the autonomic system, the two parts being antagonistic yet controlled so as to maintain a constant internal environment within the body. As he justly remarks, if the complicated structure of the hypothalamus, with its numerous centres and tracts, does not seem to harmonize with such an apparently simple dual mechanism, then the only alternative is to regard the hypothalamus as a single unit, comparable to the cerebral cortex in its method of receiving, selecting, and transmitting nerve impulses to and from other parts of the nervous system. It is difficult to decide which of these two conceptions approximates more closely to the truth, but the theory of the dual mechanism offers a satisfactory explanation for the reactions of the body to cold and heat.

Dr. Beattie also discusses the relationship of the hypophysis to the hypothalamus. A nervous pathway connecting the two is readily demonstrable; the possibility that chemical substances may pass from the hypophysis more or less directly to the hypothalamus cannot be denied; but the balance of evidence at the moment seems to be against a direct connexion by a system of "portal" blood vessels.

The lectures by Dr. George Riddoch and Mr. Norman Dott on the clinical and the surgical aspects of hypothalamic disorders are full of interest, not only to the neurologist but to the general physician as well. Every thoughtful surgeon must also find that these clinical records throw fresh light upon many of the yet unsolved problems of visceral disease, such as gastric ulceration, the sequelae of cerebral injury, and certain metabolic upsets. In addition to a masterly description of the clinical manifestations of derangements of the hypothalamus, Dr. Riddoch gives us a very clear account of an astonishingly large number of pathological processes which may be responsible.

Mr. Dott's contribution is a remarkable testimony to the value of surgery as an instrument of research, and a brilliant exposition of how much may be gained from the painstaking study of a comparatively small group of patients. The monograph is beautifully illustrated, Mr. Chesterman's photomicrographs and Miss Thom's drawings being particularly praiseworthy; and a full bibliography puts the finishing touch to a classical contribution to medical literature.

BOOKS ON OBSTETRICS

A Manual of Obstetrics. By Thomas Watts Eden, M.D., C.M., F.R.C.P., F.R.C.S.Ed., F.C.O.G., and Eardley Holland, M.D., B.S., F.R.C.S., F.C.O.G. Eighth edition. (Pp. 765; 395 figures; 12 plates. 24s.) London: J. and A. Churchill. 1937.

Obstetrics. By Gibbon Fitzgibbon, M.D., M.Ch., B.A.O., F.R.C.P.I. F.C.O.G. (Pp. 484; 167 figures. 16s.) Dublin: Browne and Nolan. 1937.

Essentials of Obstetrical and Gynecological Pathology with Clinical Correlation. By Marion Douglass, M.D., F.A.C.S., and Robert L. Faulkner, M.D. (Pp. 187; 148 illustrations. 21s. net.) London: Henry Kimpton. 1938.

A Textbook of Midwifery for Students and Practitioners. By R. W. Johnstone, C.B.E., M.D., F.R.C.S.Ed., F.C.O.G. Ninth edition. (Pp. 483; 282 illustrations. 18s. net.) London: Adam and Charles Black. 1937.

This latest edition of Eden and Holland's manual contains several additional features of interest. The general arrangement is the same as before, but many individual chapters have been rewritten, including those on the anaemias of pregnancy, pyelitis, and abortion. There are many new illustrations, and though in some aspects, such as the chemotherapy of puerperal sepsis, even the most modern textbook becomes out of date almost coincidently with publication, the latest advances are described in their necessary detail. The mature experience and judgment of the authors are evident everywhere throughout the book, which adequately continues its original high standard.

Written by one of the Rotunda's most distinguished Masters, Gibbon Fitzgibbon's *Obstetrics* provides in a concise and extremely readable form the main teachings of the Dublin School. It has been written mainly for the medical student and general practitioner, and few manuals on the subject are so adequately designed to provide the balance of theoretical and practical knowledge required by this combination. Many of the author's views are admittedly controversial, such as his advocacy of the induction of premature labour in primigravidae as the ideal treatment for disproportion, and his recommendation of pubiotomy for impacted brow presentations, etc. It is also a little strange that in an authoritative treatise such as this ergometrine is not even mentioned, while radiographic pelvimetry is dismissed in a few lines. The use

of Willett's forceps is only mentioned to indicate that the author has no personal experience of the method, a somewhat disarming admission in view of its almost universal adoption, in this country at least. With these exceptions, however, the book is a handy and concise compression of modern obstetric teaching, and provides a happy medium between the better-known but generally more cumbrous volumes and the usually too short synopses now in general use.

Essentials of Obstetrical and Gynecological Pathology is the latest of the recent spate of textbooks devoted to obstetric and gynaecological pathology. It differs, however, from most similar publications in that it is addressed particularly to the medical student, and to the practitioner studying the problem for the first time. In addition there is a considerable amount of space devoted to clinical diagnosis and treatment. Each disease is thus described in all its aspects, and the result is a very useful summary of modern gynaecological teaching. The compression of so much matter into so short a space has made the book a somewhat elementary and therefore dogmatic one, but this adds to rather than detracts from its original purpose. The illustrations are simple and appropriate, but as in so many recent American textbooks the English is so transatlantic in style that it is often difficult to understand without very careful perusal.

The new edition of Professor Johnstone's *Textbook of Midwifery* maintains the high standard of its predecessors. The general arrangement is the same, with occasional additions of modern interest, such as the recommendation of Calvert's urea range test in toxaemia in place of the globulin test, the use of sulphonamide in puerperal sepsis, etc. One or two fallacies are perpetuated—for example, the value of anti-streptococcal serum—but the book generally adopts throughout the healthy conservatism characteristic of the best practice of midwifery.

TINNED FOOD

Canned Foods and the Canning Industry. By F. Huntly Woodcock and W. R. Lewis, B.Sc. With a foreword by George W. Cadbury, M.A. (Pp. 119; 23 illustrations. 7s. 6d. net.) London: Sir Isaac Pitman and Sons. 1938.

The principles of and procedure for the canning of foods with a view to their preservation are included in courses at technical institutes where classes are held for the study of matters of this kind. The methods used should be of interest also to manufacturers and purveyors, to food inspectors in the discharge of their duty, and to the general public, who are the appreciative consumers of the finished product. All such will find in Mr. Huntly Woodcock's book an informative account of the canning industry, which, beginning with a note on Nicholas Appert, the inventor, near the close of the eighteenth century, proceeds thereafter to exhibit in appropriate order how the tin-plate containers are made, filled, and tested, whence in the world the various foodstuffs originate, and how they are graded, prepared, and finally processed in order that they may keep. It is stated that traces of iron or tin derived by the foods from the tin-plate of the cans are for practical purposes negligible. The claim that ptomaine poisoning by canned foods is apocryphal will at once be conceded by the medical reader, who will also recognize as entirely reasonable the author's pronouncement that the carefully selected, cleaned, and processed canned article is on the whole less likely than the ordinary run of more casually prepared foods to contain the principal infective agent in bacterial food poisoning—namely, Salmonella. As regards botulism, it is quoted aptly enough that the only authentic outbreak in this country—that at Lochmaree in 1922—was traced to a meat product packed in glass, not in a tin-plate can. Nevertheless, since people are still so prone to suspicion, it is recommended that distributors of canned foods should insure themselves against third party claims in respect of alleged food poisoning.

A MANUAL OF HYGIENE

Hygiene. By J. R. Currie, M.A.Oxon, M.D.Glas., D.P.H.Birm., F.R.C.P.Ed. Manual of Public Health. (Pp. 324; 34 figures. 15 tables. 15s. net, postage 6d.) Edinburgh: E. and S. Livingstone. 1938.

Seeing that the great majority of medical students eventually undertake general practice, and recognizing the increasing importance in such practice of a wide and detailed knowledge of personal, domestic, and industrial hygiene and of the extensive provision now made for attending to the public health, there is ample room for a textbook dealing with such subjects from the point of view indicated rather than from that of a member of the public health service itself or from that of a candidate for a diploma with a view to entering that service. Such a textbook is admirably provided by Dr. J. R. Currie, Henry Mechan Professor of Public Health in the University of Glasgow, in a volume entitled simply *Hygiene.* The author evidently intends it to be of use to the student in giving him the essentials of knowledge of the field which it covers, in enabling him to meet satisfactorily any questions on these matters which he is liable to be asked in his final examinations, and in aiding him to confront and understand many of the common duties and situations with which he will be concerned immediately he enters upon practice. The details of public health law and administration are not dealt with, but the book is informative and adequate in guidance on practical points the facts relating to which are not easy for a busy practitioner always to have in mind.

The scope and scheme of the book may be indicated by some of its main chapter headings, perhaps best arranged in three groups: (1) inheritance, maternity and child welfare, school hygiene, industrial hygiene, social insurance; (2) food, ventilation, heating, lighting, water supply, waste disposal, housing; (3) personal hygiene, infection and prevention, infestation, community diseases. The proportion observed is judicious, the arrangement easy of reference, and the presentation interesting, though at times, perhaps, too concentrated. Opinions expressed on such subjects as eugenics and a maternity service are moderate, wise, and in conformity with general medical opinion. A few detailed points may be noted. In dealing with national health insurance the differences between Scottish and English requirements, with regard to records especially, might well be mentioned, the disciplinary machinery as affecting practitioners might be somewhat more fully set out, and the method of remuneration is not quite accurately stated when it is said to be "at the rate of 9s. per annum for each person on his list." An exact understanding on these points is of real value to the young practitioner if misconceptions, which sometimes give rise to trouble, are to be avoided. In the section on mental defect it might be emphasized that there is a continuous line of variability in mental power from the idiot up to the normal person, and the reference to dull and backward children might be brought into closer association with this chapter. In the section on vital statistics a description of "fertility rates" and some discussion of the

population question would be helpful. The statement in reference to domiciliary attendance on public assistance patients that "in large and densely populated cities with much aggregation of poor persons the only workable way" is by the appointment of whole-time district medical officers should be reconsidered, and experience of providing this by the "panel" or "open choice" method is now sufficient for its effects and advantages to be noted. These are all minor points and are only mentioned so that Professor Currie may consider whether he would wish to make any alterations or amplifications such as those indicated if, as is quite probable, his book becomes one of the recognized textbooks on the subject for medical students and practitioners.

ARTHRITIS, FIBROSITIS, AND GOUT

Arthritis, Fibrositis, and Gout. A Handbook for the General Practitioner. By C. W. Buckley, M.D., F.R.C.P. (Pp. 153; 24 figures. 7s. 6d. net.) London: H. K. Lewis and Co. 1938.

Dr. Buckley has assembled his ripe experience of the "rheumatic diseases" into a small volume founded on a series of postgraduate lectures. For the general practitioner this book could hardly be bettered. It is concise, practical, readable, and, above all, sane and well balanced. Rheumatoid arthritis, chronic villous arthritis, osteoarthritis, spondylitis, fibrositis, and gout are dealt with, acute rheumatism and the specific arthritides being definitely excluded.

The reader will find in this book a fair discussion of all the modern therapeutic methods, exposing the unguarded enthusiasm of certain pioneers who are apt to push a new treatment in these diseases, which are all too common and all too difficult to treat, because they see therein personal opportunity. Thus, in the discussion of gold treatment stress is laid on the real risks and the precautions which ought to be taken to avoid them, while welcoming the very encouraging advance which has been made through these methods in the treatment of rheumatoid arthritis. With the success of vaccines, which are all too easy to administer, Dr. Buckley from his ripe experience is not very much impressed. The best he can find to say about this very popular method of therapy is that vaccines will sometimes do good, and if the dose is small there is little or no risk. As might be expected, the chapters on spondylitis are excellent and authoritative, for to this disease Dr. Buckley has devoted great attention in recent years. His book is a really valuable summary of present knowledge and is to be thoroughly recommended.

Notes on Books

The *Life and Letters of Fielding H. Garrison* is published by the Medico-Historical Press, Boston. During his busy life of threescore years and five Fielding Garrison, author of the wonderfully complete and accurate *Introduction to the History of Medicine*, was an official librarian in the Army Medical Library, Washington, from 1891 to 1930, where he carried on the tradition of J. S. Billings and Robert Fletcher, and for the last five years of his life at the Welch Memorial Library, Baltimore. His colleagues have paid many tributes to his labours, and now Dr. S. R. KAGAN of Roxbury, Massachusetts, has brought out this account of him as medical historian, bibliographer, and biographer, as a man, and as a cultivated musician, a mathematician, and a physicist. More than this, Dr. Kagan has brought together the numerous tributes to this versatile but modest and very sensitive personality, and collected here many of the letters he wrote, especially to Dr. E. C. Streeter, Dr. F. R. Packard, Editor of the *Annals of Medical History*, and Sir D'Arcy Power. He was a great correspondent, and thus made friends whom he never saw, such as Sir Clifford Allbutt. Professor Charles Singer, who had corresponded with him for sixteen years before they met in 1930 when Garrison paid his only visit to Europe, described him as "the most modest and retiring of scholars, but at the same time an acute and searching critic." It was, perhaps, characteristic of him that he omitted from the great Index Catalogue of the Army Medical Library many of his own valuable writings.

The London Regional Advisory Council for Juvenile Employment appointed by the Minister of Labour has issued a revised edition of the *Guide to Employment for Boys and Girls in Greater London*, first published in 1928. It should prove a useful handbook for all who are concerned with the vocational guidance of young persons, though it should not be regarded as a substitute for personal advice, which can be obtained from the juvenile advisory committees attached to employment exchanges and the juvenile employment committees established by local education authorities. The Guide is published by H.M. Stationery Office, price 2s.

Well within the intellectual and financial compass of all, *A Guide to Human Parasitology*, by Professor D. B. BLACKLOCK and Dr. T. SOUTHWELL, is probably the best elementary textbook on the subject. A third edition has now been published by H. K. Lewis and Co. at 12s. 6d. Supplemented by a course of practical work it will provide a sound base from which the student may advance confidently to intelligent practice or future study in the field of disease caused by animal parasites.

Preparations and Appliances

LACTOFLAVINE

Lactoflavine B.D.H. (British Drug Houses Ltd.) is a synthetic pigment identical with the naturally occurring substance. Its formula is pyrimidine-azine-benzene-dimethyl-*d*-ribose.

Lactoflavine (vitamin B_2) occurs naturally associated with vitamin B_1 (the rat anti-dermatitis factor) and the pellagra-preventing factor, which is believed to be nicotinic acid. In the body lactoflavine is phosphorylated and the compound is combined with a protein to form Warburg's yellow respiratory pigment. The latter appears to be an essential portion of the respiratory mechanism of cells. The effects of lactoflavine deficiency are uncertain, but it is believed to cause cataract and neural degeneration.

The manufacturers suggest the trial of the synthetic product as an adjuvant in various forms of anaemia, cataract, and certain cyanotic conditions. It is only a few years since vitamin B_2 was shown to be lactoflavine, and the speed with which the synthesis of the latter has been achieved is remarkable. This synthesis provides a supply adequate for clinical trials, and we may reasonably hope for a rapid increase in knowledge regarding its therapeutic value.

A BREAST RELIEVER PAD

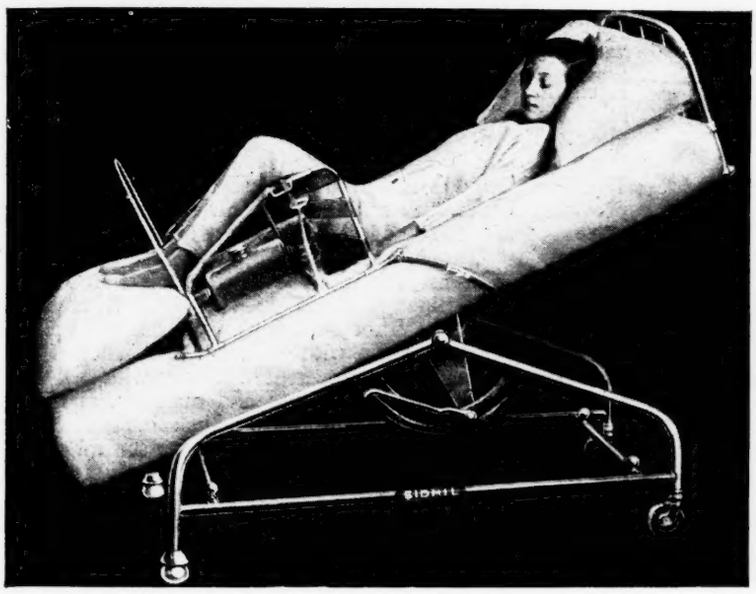
When a flushed and tender breast has to be evacuated during the puerperium the process is likely to be painful even with the modern type of breast pump. To make things easier a special sponge-filled rubber ring has been devised to place over the nipple between the breast pump and the tender breast. The makers, Messrs. J. G. Franklin and Co., india-rubber manufacturers, 15, Colvestone Crescent, London, E.8, claim that their product "the simplic patent breast reliever pad" has proved on clinical testing to supply great comfort and relief. The retail price is 2s. 6d.

USES OF A NEW TILTABLE BED WITH DONKEY

Dr. F. C. EVE, F.R.C.P. (Hull), writes:

The illustration shows without verbal description the ease with which an effective and desirable tilt can be attained and clamped. The *feet-down* position is used in heart cases, pneumonia, asthma, the Fowler position, and in anasarca with puncture drainage (highly effective); the *head-down* position in shock, spinal anaesthesia, bronchiectasis, parturient haemorrhage, to stop "death rattle," and to prevent deglutition pneumonia by the patient swallowing uphill (*Clin. J.*, October, 1937). Artificial respiration by my rocking method may be maintained for a few days by rocking the bed through 80 degrees a dozen times a minute, and has saved life in diphtheritic paralysis of the diaphragm (*Lancet*, 1933, **2**, 740).

The tilting bed would be useless without the adjustable donkey, which, tied as it is to the bed-frame, prevents the tilted patient from slipping down at all. Bedsores are avoided because the weight of the tilted patient is taken from the sacrum to the thighs. Thigh length varies greatly; hence the height of the arch of the inverted hammock is made variable by merely slackening two lateral straps. The bare hot bottle is placed under the arch of the donkey, where it cannot touch the patient and whence the hot air circulates round the legs. The donkey is also useful in an ordinary flat bed, where it entirely prevents the usual slipping and hoisting of a propped-up patient. For phlebitis and swollen legs the donkey is reversed to encourage return circulation by an effective slope.



In the post-operative Fowler position the drainage tilt (intermittent if desired) is attained with a straight spine and a flat abdomen instead of the usual bent spine and bulging abdomen conducive to ileus and stretched incision. This is an important gain. A new lateral Fowler position is made possible (knees on mattress, thighs on a pillow on the donkey) for dependent drainage after chest or kidney operations.

The heels do not press on bed or donkey, thus avoiding bedsore or the common heel pain. An arched rod takes the pressure of the bedclothes. The donkey—used on any bed or couch—produces an extraordinary feeling of complete relaxation, due to its straightening the lumbar spine and semi-flexing the three great leg-joints.

Gravity is the old enemy of the nurse and her toneless patient in bed: these two devices are designed to convert gravity into a friend. Experience has convinced me that they open up to the ingenious clinician and surgeon new opportunities of affording comfort and cure or of saving life.

The manufacturers (Messrs. Siddall & Hilton, Sowerby Bridge, Yorkshire) have been at pains to meet clinical requirements at low cost. A fuller paper, with illustrative cases, is pending.

USE OF A STRETCHER AS A SPLINT

Mr. D. G. DUFF, F.R.C.S.Ed. (Denbighshire Infirmary), writes:

Under the stimulus of a letter describing their requirements from Dr. C. Paget Lapage, chairman of the First Aid Committee of Mountaineering Associations, I have worked out a stretcher system which may find a wider applicability in first-aid work—for example, in mines and in the Services. It will be realized that in rock climbing and mountaineering, methods of first-aid treatment and transport are very fully tested. A cross-bar of mild steel (three-quarters of an inch wide by a quarter of an inch thick) slides over the foot ends of the poles of a wooden stretcher (telescopic-handled or standard), fixing in position by a strong screw through each pole at the site of an existing metal band. This cross-bar will be recognized as a modification of the usual suspension bar used for a Thomas splint. It stands only five inches above the canvas and projects three inches beyond the foot of the stretcher. It has two screw clamps on each side, which can firmly grip the notched lower end of a Thomas splint previously fitted to the right or left leg of the patient. A second light bar across at canvas level gives a support under the foot of an uninjured limb.

A twenty-inch-broad canvas band, fixed to the stretcher pole at one side, passes over the patient's pelvis, abdomen, and chest, and straps to the opposite pole so as to secure him firmly, a central lacing allowing the necessary expansion for stout patients. Shoulder straps, fixed to the canvas behind, come over the shoulders to fix like braces to the canvas belt in front. A broad band, passing through eyelets in the canvas and normally in use to close the opening of the pillow pocket, is used to secure the patient's head to the canvas in cases of cervical spine injury.

A patient so splinted to the stretcher may be carried on a slope, raised or lowered in a vertical position by ropes tied to the stretcher, the Thomas splint being used for him to sit in, as in a walking calliper, whether there is a fractured leg (the usual injury) or not. The patient is thus secured from painful movement even in the case of fractured spine, chest wall, etc., during his transport from the site of accident, no matter how difficult of access, until his reception in a hospital bed. The stretcher and apparatus illustrated have been cheaply made by local craftsmen. It is 6 feet 3 inches long and handles extend 20 inches. A criticism is, of course, in its reliance on the Thomas splint, the use of which is not yet normally taught by ambulance associations. It is hoped, however, that the apparatus described will help to alleviate physical pain and nervous shock

EFFICIENCY OF STEAM STERILIZERS

BY

H. R. RISHWORTH, F.R.C.S.

District Medical Officer, Indian State Railways; Late Honorary Surgeon, St. George's European General Hospital, Bombay

Experiments recently published in the *British Medical Journal* (Hayes, 1937) indicate that surgical sterilizers may be dangerously inefficient. Stress has been rightly laid on the mode of packing and the nature of the material sterilized. It seems worth while inquiring, however, whether the usual method of pressure-gauge control and the system of timing the period of sterilization now used are satisfactory in these instruments. Nearly all the published tables giving the properties of saturated steam have been constructed on empirical formulae based on the researches of Regnault on pure steam. Table I (Low, 1931) gives the figures for pure saturated steam at pressures and temperatures within a range applicable to the subject under discussion.

TABLE I

P (lb.)	PG (lb.)	T (F.)	T (C.)
20	5.3	227.9°	108.8°
24	9.3	237.8°	114°
25	10.3	240°	115.5°
26	11.3	242.2°	116°
27	12.3	244.3°	118°
28	13.3	246.3°	119°
30	15.3	250.3°	121.5°

P = Absolute pressure; PG = Gauge pressure; T = Temperature.
Absolute pressure = gauge pressure + atmospheric pressure (14.7 lb. per sq. in.).

It is certain, however, that in the majority of sterilizers in use to-day we are not dealing with pure saturated steam but with a mixture of steam and air, and the inferential temperatures in these tables, therefore, cannot without modification be applied directly in practice.

If the degree of preliminary vacuum in a chamber is known it is a simple matter to ascertain the true pressure of the steam in any given mixture of steam and air. The usual pattern of ejector used in sterilizers cannot be expected, in a single operation, to produce a vacuum of more than 10 inches of mercury (Underwood). Suppose the preliminary vacuum to be 10 inches; the residual air will then be at a pressure of 10 lb. per square inch (approx.). If steam is now let in up to a gauge pressure of 15 lb. the absolute pressure of the mixture will be 30 lb., of which the steam accounts for 20 lb. (Dalton's law). Steam at an absolute pressure of 20 lb. can only attain a temperature of 227.9° F. (see Table I), but it is not uncommon for a maker to assume that a gauge reading of 15 lb. obtained in this way is sufficient evidence of safe working.

Table II shows the possible temperatures of steam at different pressures for given mixtures of steam and air. It can be seen from this table that a temperature above 240° F. with a gauge reading of 15 lb. is only possible in a chamber with a preliminary partial vacuum of 22 inches of mercury, a figure which is more than double the capacity of the average steam-ejector mechanism for a single working.

TABLE II.—*Temperatures at Different Pressures of Mixtures of Air and Steam*

Gauge Pressure in lb.	Pure Steam	Steam and Air at 22.5 inches Vacuum	Steam and Air at 15 inches	Steam and Air at Atmospheric Pressure—that is, no Vacuum
10	240°	230°	220°	193°
15	250°	242°	224°	212°
20	259°	258°	245°	228°

The standards for effective sterilization given in surgical and bacteriological textbooks are not comprehensive enough. The usual expression met with is "pure steam at a temperature of 240° F. for twenty minutes," and while this is strictly accurate as a statement of fact it is of little use in practice to makers and operators, since pure steam is not used in the vast majority of sterilizers on the market to-day. A practical and comprehensive standard should read as follows:

"A temperature of 240° F. or 115° C. obtained by pure steam under a pressure of 10 lb. per square inch, or, if any mixture of steam and air is used, at such additional pressure as will fully compensate for the partial pressure of the air."

In addition to the effect of residual air on temperature it is important to examine the time factor. A pressure-gauge reading is the result of a comparatively rapid response of the instrument to any changes in pressure. This condition, however, cannot obtain with regard to temperature. Time is necessary to build up a given temperature, and a thermometer rise will always show an appreciable lag after a given pressure-gauge reading. It is thus clear that if the standard accepted is twenty minutes at 240° F., then it will be some appreciable time after the gauge reaches the desired pressure before the whole mass of dressings attains the required temperature. That this period is not negligible has been experimentally proved, and the curves in Fig. 1 show that it may be so prolonged that the standard of 240° F. for twenty minutes is never fulfilled in what may be regarded as normal working conditions for many sterilizers on the market to-day. This temperature lag period, since it depends on many factors, cannot be arbitrarily fixed before the operation. It will vary with different instruments. In the same instrument, moreover, it will vary with different loads, depending on their nature and quantity, and also in summer and in winter. Further, if the same instrument is worked more than once in succession, the second working in a warm apparatus will need a shorter time-lag allowance than the first working. A strong case exists, therefore, for thermometric rather than gauge control of the time factor in sterilizers.

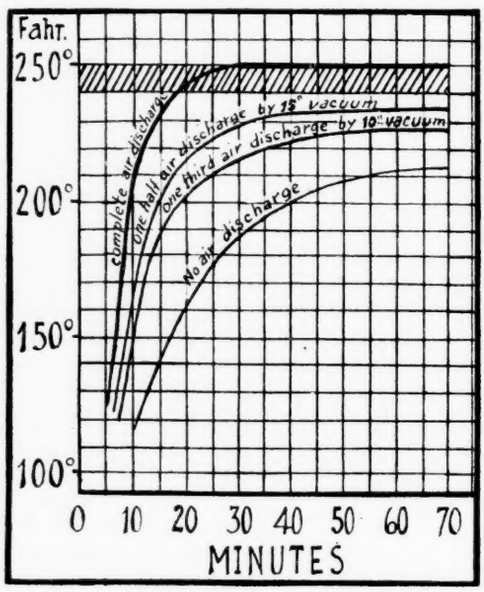


FIG. 1 (from Underwood).—Temperature obtained, at 15 lb. gauge pressure, in a sterilizer with varying degrees of preliminary vacuum, showing lag in rise of temperature and the degrading effect of residual air on the temperatures anticipated from gauge readings.

Numerous devices are on the market for insertion among the dressings which, by fusion or a change of colour, indicate that the desired temperature has been reached inside the drums. These devices are not always reliable (Hayes, 1937; Underwood, 1934), and they have the grave defect, even when functioning accurately, of not showing the precise moment when the required temperature has been attained. They are of no value, therefore, in controlling the variable time-lag factor. The lag in building up the temperature may be so excessive from various causes that the fusion or colour change may actually occur just a moment before the period of sterilization is brought to an end and the sterilizer opened (Fig. 1).

It now remains to discuss the means by which sterilizers can be efficiently worked and the maximum degree of safety ensured. There are two ways in which the problem may be dealt with: (1) the gravity discharge system; (2) the direct internal thermometer control system.

The Gravity Discharge System

This is the name given by Underwood to his system of sterilizer operation. It is applicable to any existing form of sterilizer provided the steam inlet and outlet are suitably placed. The following is a brief description of the method: Air is twice as heavy as steam, and steam when run into a chamber containing air tends to float on a bed of air. Gravity therefore tends to locate the air in the lowest parts of the chamber (see Fig. 2). If

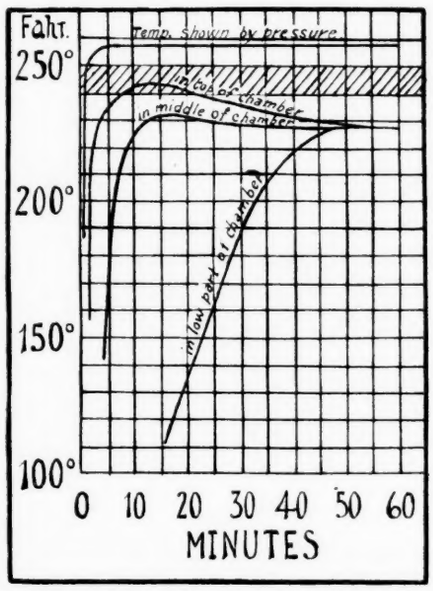


FIG. 2 (from Underwood).—Curves showing differences in temperature readings in different parts of a sterilizer. The coolest part of the chamber is at floor level. No air has been evacuated. The three lowest curves are by temperature readings, the top curve by inferential gauge reading.

now, while steam is being run in, the exhaust pipe from the chamber is kept open a discharge of air and steam and condensed water vapour will escape. With the escape of air and steam there is of course a drop in the jacket pressure, which at the start should have been at its maximum—that is, 10 lb. The chamber pressure, owing to the fact that the exhaust is open, will only rise slightly—about 3 or 4 lb. It should not rise more than this. If this process is continued long enough (five minutes recommended) the operator will notice a change in the nature of the escape. It will at about the end of the period consist of a fine feathery discharge presumably of pure steam, as all the air inside the chamber will have been removed by the so-called gravity displacement. The exhaust outlet is at this stage almost but not quite shut off. It is left open just enough to allow a continuous escape of this fine feathery steam vapour *throughout the entire operation of sterilization*. As there is only a slight escape of steam the chamber pressure, if the heating arrangement is strong enough, should continue to rise until a pressure of 10 lb. is obtained. The operation of sterilization is timed to begin at this point and continued for twenty minutes, the required pressure being maintained by the safety-valve and the intensity of the heaters or burners. With this method Underwood has found that with 10 lb. pressure a temperature of 240° F. can invariably be obtained inside the chamber, as tested by potentiometer readings. The temperature inside the chamber can also be deduced indirectly. When all the air is out and the fine feathery vapour is continuously escaping from the outlet, it is evident that a thermometer placed in the path of this vapour will give a reading which cannot be higher than the temperature of the steam in the chamber. Underwood claims that a thermometer placed in this discharge vapour will record a temperature between 240° and 250° F. for 15 lb. pressure, and by actual experiment I have been able to show a temperature of 239° F., working at 10 lb. pressure.

It is important to note that it is not possible to prove this effectively by merely holding the thermometer in the steam current as it escapes from the outlet. Steam released from a chamber under pressure expands almost adiabatically. It thus becomes unsaturated and heats a thermometer very slowly (Watson, 1926). To repeat the experiment correctly the thermometer bulb should be in the path of the steam in the outlet tube, preferably on the proximal side of the exhaust valve.

Some sterilizers have the outlet located at the top. Steam is usually allowed to escape for five minutes and the exhaust completely closed before sterilization is started. Owing to the relative densities of steam and air a complete evacuation of residual air cannot be effected in these sterilizers. The essential requirements are an exhaust at the lowest level in the sterilizer, an inlet at a high level in the chamber, and a continuous escape of a fine stream of vapour during the whole process of sterilization.

In actual practice the sterilizers made to Underwood's design have a thermostatic control at the outlet. It expands when heated and contracts when cool. The size is so adjusted to the outlet that at a given temperature it expands just enough to allow the slight continuous escape of steam essential to the correct working of this method. In the path of the discharge a thermometer is inserted, and in some models it may be connected with a recording device. Automatic control with complete elimination of the personal factor is a comparatively simple engineering problem, and is effected by operating a timing device from the discharge thermometer.

Direct Internal Thermometer Control System

There are many obvious ways of working this. The Cambridge Instrument Company, Ltd., produce a mercurial type of thermometer enclosed in a bulb of special heat- and pressure-resisting steel, which is connected by means of a metal capillary tube to a dial or other recorder outside the chamber. The range of temperature is from 50° to 300° F., and such thermometers find many applications in trade and industry. The capillary tube, however, is not a flexible arrangement, so that the location of the thermometer is of necessity limited: it would normally be fixed to the floor or wall of the chamber. This disadvantage can be overcome by the use of a potentiometer such as a Leeds and Northrup potentiometer with flexible thermocouples, which can be inserted through or under the door of the sterilizer. Potentiometers are, however, delicate and costly instruments, and not adapted to routine use. A simpler and less costly device is that described by Rosenau (1903) and Hayes (1937), although with this instrument only a definite predetermined maximum reading of temperature can be recorded.

Large and costly machines with patented fully automatic devices controlled from the pressure gauge alone may be seen in most hospitals and disinfection stations to-day. Unhappily it is not yet clearly appreciated that they are defective in two essential features and may be dangerous. These defective features are, first, the use of the pressure gauge as an inferential device for reading or recording temperature, and, secondly, the timing of the sterilizing process, which is regulated by clock to commence from the moment the desired pressure is attained on the gauge. I have convinced a well-known firm of manufacturers of these real defects, and they have now produced an automatic control dependent on a mercurial thermostat located inside the chamber. It must be remembered, however, that it is possible for a thermometer in one part to show the required temperature while another part of the chamber, depending on its position and the nature of its contents, gives a lower reading (vide Fig. 2). To meet this difficulty and also to protect the thermostat from wear and tear it has been located in a suitable dummy drum placed low down and attached permanently to the door of the sterilizer. This dummy drum is the model drum, and is packed with a sample of the most difficult type of material used, and the operator is instructed to see that no other drum in the load is packed more tightly. Any temperature attained in this drum by reason of its contents, the method of packing, and its low level with reference to the outlet must be lower than or equal to that attained in any other drum in the load.

It has been suggested that a thermostat located near the wall of the chamber is subject to radiation effects from the jacket, and may show a higher reading than the deeper contents of the chamber. This objection is unimportant, as the jackets of sterilizers do not extend over the doors, and, if anything, that part of the chamber near the door is the coolest part so far as the walls are concerned, since it is subject to most loss by radiation to the metal door. Smaller and cheaper sterilizers without automatic control which have little room for a dummy drum can be worked on the same principle, with a thermostat located in a small flat metal cage on the floor, the electrical connexions being carried through insulated openings in the jacket.

The Two Systems Contrasted

I now come to the relative advantages of these two systems. Both appear to fulfil the conditions which I have stressed in the foregoing paragraphs. The choice will perhaps depend on cost and applicability to local conditions, or other features which have little bearing on their efficiency. There are certain arguments, however, which should be given close attention before a final decision is arrived at. It is claimed that in the gravity discharge system the control temperature at the discharge must be lower than any temperature which is attained in the chamber. It is not certain, however, that the steam cannot on occasion make a rapid transit through an artificial channel among the dressings from inlet to outlet, leaving pockets of air in dead ends among the dressings. The outlet temperature would then approximate to or even equal the inlet temperature, and yet appreciable areas of the chamber may be left at dangerously cool levels. The case, therefore, for a reasonably high degree of preliminary vacuum which would assist diffusion of steam into the recesses of dressings remains a strong one. This applies with special force when sterilizing containers with fluid media or saline, etc., which must of necessity stand with their openings upwards and thus offer the most adverse conditions for any gravity effects on their contained air. Each container in effect acts as a miniature chamber, with its inlet in the worst possible position—namely, at the top.

Another factor, depending on the behaviour of gases when mixed, should be taken into account when considering the value of a preliminary vacuum. If we have a chamber from which all air has been removed, and by means of a steam pipe suddenly place it in communication with a boiler containing boiling water, the water will at once produce enough vapour to saturate the space, and the pressure will rapidly rise to a given value depending on the intensity of heat applied to the boiler (Watson, 1926). If, however, we have a chamber which has not been subjected to any preliminary vacuum and we place it in connexion with a steam boiler, the process of building up the pressure and temperature will be much slower. Thus when the gravity method is used the total time during which surgical materials are exposed to heat is necessarily longer than if a vacuum process is used. Although the earlier stages of heating in both methods will be represented by curves in which no point is higher than the final 240° F., nevertheless with a preliminary vacuum the rise of the curve to 240° F. will be steep and rapid, but with the gravity displacement it must be slower and less steep, and the difference between the two curves will be accentuated the heavier the load and the more intricate the interspaces in the dressings. The balance of economy in fuel, in time, and particularly in perishable rubber materials by reason of the additional baking period, is therefore in favour of a preliminary vacuum, since the variable time-lag factor will be less with this method.

Another possible objection to the gravity discharge type of sterilizer is the use of the expansion thermostat at the outlet. Even the best of these are subject to fatigue changes, and unless an adequate service department is available to effect an alteration in this device when necessary it may become a source of trouble and therefore not be so reliable as an internal mercurial thermostat with automatic control. It is also possible, with a thermostatic control in the outlet, to have prolonged working without the desired temperature being attained owing to clogging of the restricted opening in the discharge valve, resulting in fuel waste and working troubles. These objections lose their force in technically advanced countries, but may attain considerable importance under conditions of working in India and other places abroad, with less expert staffs. They do not apply in the case of simple sterilizers without any form of thermostatic control. With such sterilizers the gravity discharge system of working should be the universal method for ensuring the maximum possible air evacuation.

Summary

1. Arguments are offered against the use of the pressure gauge for inferential readings of temperatures in sterilizers.

2. Residual air and lag in temperature rise are two fundamental causes of inefficiency in working.

3. No instrument designed to work at 10 lb. pressure can be effective unless a preliminary vacuum of not less than 30 inches has been secured in the chamber, and if 15 lb. is used the minimum vacuum necessary is at least 21 inches to secure a lethal temperature of 240° F.

4. Two systems for ensuring maximum efficiency in sterilizers are described and their relative merits discussed.

I have to acknowledge with thanks permission from W. B. Underwood to reproduce Figs. 1 and 2 from his textbook.

REFERENCES

Hayes, S. N. (1937). *British Medical Journal*, **2**, 86.
Low, D. A. (1931). *Pocket Book for Engineers*, London.
Rosenau, M. J. (1903). *A Practical Guide to Disinfection*, London.
Underwood, W. B. (1934). *Textbook of Sterilization*, Pennsylvania, U.S.A.
Watson, W. (1926). *A Text Book of Physics*, London.

The Middlesex County Council has resolved to rebuild the North Middlesex Hospital at a cost of £1,219,000. The original scheme for a building costing £1,680,208 did not meet with the approval of the Ministry of Health. To provide the hospital accommodation needed the Council will erect a new building at Theobalds Park and add 100 beds to the proposed new hospital at Finchley.

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THE OCCIPITO-POSTERIOR CASE

Of the numerous conditions which give rise to difficulty in labour none has caused greater perplexity in the mind, not only of the student but also of the teacher, than the trivial modification of the usual foetal position known as "occipito-posterior position of the vertex." The Section of Obstetrics and Gynaecology, therefore, did well to choose this subject for formal discussion at the recent Plymouth Meeting of the British Medical Association. Professor Chassar Moir, the first occupant of the recently established Nuffield Chair of Obstetrics and Gynaecology in the University of Oxford, opened the discussion with a lucid and effectively delivered address, which received a warm welcome from his hearers and will be found in the opening pages of the *Journal* this week. The subsequent discussion, which was strictly practical in character, has been summarized already in a previous issue (July 30, p. 240). It is interesting to examine this discussion from the point of view of the practitioner who, realizing the importance of the subject and its difficulties, seeks guidance in the proceedings of our Scientific Sections. With a unanimity unwonted in obstetric circles it was agreed that the best line of management was to correct the malposition of the head by manual rotation and deliver with the occiput in front; the moment for this manipulative intervention must, however, be chosen with care and judgment. In only a minority of cases will it be necessary. It should be further noted that by manual rotation is meant, not a mere twisting of the neck of the foetus, but a complete rotation of the trunk and head so as to preserve the normal relation of the back of the head to the foetal spine. This manœuvre is described and figured in every text-book of midwifery and demonstrated upon the dummy in tutorial classes, and the impression derived by the student usually is that it is a matter of no particular difficulty. This impression will not be corrected until he first attempts to carry out the procedure himself upon a woman in labour, and the correction of the impression may then cause him a shock which he is likely never to forget. Difficulties may be said to have been the main preoccupation of speakers in the discussion at Plymouth.

Accurate diagnosis, which is naturally of prime importance, can only be made, in Professor Chassar Moir's view, when labour is in progress, and then only by introducing the whole hand into the vagina, under full surgical anaesthesia. Attempts to make ante-natal diagnosis, we learn, are not of great importance, since the head does not, as a rule, lie in an oblique pelvic diameter before labour starts; it is more likely to lie somewhere between the transverse and an oblique diameter, and may rotate in either direction when it settles into the pelvis. Further, abdominal examination is an unreliable method of determining the position, for radiologists have shown that the neck of the foetus *in utero* may be so twisted as to make location of the back by abdominal palpation a misleading index of the position of the occiput. In this respect views have evidently undergone some change, for until recently considerable importance was attached to ante-natal diagnosis and to the correction of the malposition by external manipulation before the onset of labour. It now appears that the frequency with which manipulations are followed by a normal labour with delivery of the head in the anterior position may prove either that the method was successful or that the ante-natal diagnosis was at fault. Doubts were expressed during the discussion as to the possibility of correcting an occipito-posterior position before labour by any known method, and if this view is correct there is nothing to be gained by attempts at prophylactic treatment. Precise diagnosis must then be postponed until it becomes possible to introduce the whole hand into the vagina without undue risk. With a primipara this procedure calls for the exercise of great patience and gentleness on the part of the obstetrician, and for the establishment of full surgical anaesthesia, because the vulval reflexes are often the last to disappear. In the case we are considering the membranes usually rupture early, moulding also occurs early, and it may be found that identification of the cranial fontanelles and sutures is not the simple matter it appears to be when examining a dried specimen of the foetal skull. How then, in a difficult case, is the position of the occiput to be finally determined? Some speakers in the discussion replied: By passing the fingers far enough up to find the ear, for the convexity of the helix is naturally directed towards the occiput. Other speakers demurred, pointing out that the external ear may be folded forwards on the face, when the convexity will be directed towards the forehead. Is there then nothing upon which the harassed practitioner can rely? Professor Chassar Moir says there is; for, by passing the fingers all round and above the head, the smooth area at the back where the

occipital region passes into the nape of the neck can always be recognized and cannot be mistaken for any part of the face. Diagnosis having been made the malposition is to be corrected, not by twisting the head round so as to bring the occiput forward, but by rotating the trunk with the fingers passed up behind the anterior shoulder. Delivery can be effected without further delay, for the passages have been already stretched by the introduction of the hand.

It cannot be denied that the Plymouth discussion is calculated to shake certain established beliefs. In 1930 Dr. Douglas Miller pointed out that from hospital statistics it appeared that 90 per cent. of cases diagnosed ante-natally as occipito-posterior were delivered spontaneously when the membranes did not rupture early and uterine pains were effective. This generally accepted view has brought comfort to many a worried mind in the past, as many other ill-founded beliefs have done in all walks of life. We should all be reluctant to jettison it, because it implied that so long as labour was making normal progress it mattered little where the occiput lay. It was not until the pace slowed down or labour was arrested that anxiety began, and nothing that was said at Plymouth invalidates this view. If the patient is a multipara, with a pelvis of normal size or larger, and the uterine pains are regular and strong, spontaneous delivery of the head after posterior rotation of the occiput is often surprisingly easy, as was pointed out at Plymouth. In the case of a primipara the difficulty of delivery is, of course, much greater and involves increased risk of injury to the child when the head reaches the pelvic floor in the face-to-pubes position. One of the speakers in the discussion (Mr. Bryan Williams) stated that in the Walton Hospital, Liverpool, there were in the year 1937 fifty-three cases of *persistent* occipito-posterior position, and of these forty-one were delivered spontaneously; there was no maternal or foetal mortality in the series of fifty-three cases. The number of multiparae in this series was not stated, but in all lying-in hospitals they form a considerable majority. Obviously then there are weighty considerations in favour of an attitude of hopeful expectancy when the existence of an occipito-posterior position is suspected before or early in labour. Equally weighty considerations there are which urge that hopeful expectancy has its limits, and if these limits are exceeded disaster may result to both mother and child. The unflexed and unrotated head may prove a real obstruction to delivery, and when, in the absence of pelvic contraction, there is clinical evidence of arrest of the head, action must be taken promptly and effectively. The hall-mark of the experienced obstetrician is his ability to await the favourable moment for intervention, and not to let that moment slip.

Obstetric experience and judgment are not easily acquired. When a student obtains his qualification to practise midwifery the opportunities he has had to gain practical knowledge of this subject, while they vary in different medical schools, never adequately fit him to deal with the emergencies of midwifery, and the new regulations of the General Medical Council which become operative during the present year will not greatly improve matters although they constitute a welcome advance. A certain number of men, endowed with rare qualities, may find it possible to become self-taught in the rough school of actual practice with full responsibility; their number is probably very small. Opportunities for instruction in midwifery, available to men already in practice, are gradually increasing in this country but are still very inadequate. The day is perhaps not far distant when the choice must be made between the present policy of training all students more or less equally and inadequately, and the alternative policy of encouraging the development of a small class of fully trained and experienced practitioners into whose hands obstetric practice would inevitably gravitate.

INDUSTRIAL HEALTH

The annual report of the Chief Inspector of Factories for 1937[1] is of special interest because of its relation to the new Factories Act, 1937. Owing to the additional requirements of the Act, which came into force on July 1 of this year, it has been necessary to increase the staff of the inspectorate substantially, and there are now 290 inspectors in all. This number includes eleven medical inspectors, and it is difficult to believe that only thirty-six years ago the inspectorate included but *one* medical inspector. In three years' time the inspectorate will total 332, and it is not unlikely that even this number will prove, in course of time, to be inadequate for its manifold duties. It might be feared that the employers would resent the additional intrusion in their factories, but the Chief Inspector, Sir Duncan Wilson, reassures us on this point when he states that "at no time in the history of factory legislation have the relations between the inspectorate and the two chief partners in industrial progress—employers and workers—been closer or more friendly." He is convinced that the spirit of reasonableness existing on all sides will cause the enforcement of the new Act to proceed smoothly, and conduce to the best interest of all engaged in industry.

[1] Cmd. 5802. London: H.M. Stationery Office, 1938. (2s., postage extra.)

Unfortunately there has been a further increase in the number of accidents reported, the total accidents (causing absence of more than three days) amounting to 192,539 and fatalities to 1,002. These figures are 9 per cent. in excess of those for 1936, and they are due partly to the increased production of steel needed for armaments. Another factor of importance is the employment of large numbers of unskilled men consequent on the shortage of skilled and semi-skilled labour. The subject of accidents to young workers, which was emphasized by the Chief Inspector in his report for 1934, is again discussed in detail. It is still a common experience of the inspectors to find that employers and managers "fail to understand that knowledge and appreciation of danger are not simply inborn and that young people cannot be expected to work safely unless they are properly and sympathetically instructed." Statistics are adduced which show that in a large number of factories the accidents to young persons were about twice as numerous as to adults, their frequency being specially great in the first year of employment. However, excellent schemes of training and subsequent supervision are reported from some districts, with a consequent reduction of accidents. The Factory Department has issued a leaflet on "Accidents to Young Workers," while the National Safety First Association has published a pamphlet entitled "Starting Young Workers Safely in Industry."

In his report on health the Senior Medical Inspector, Dr. J. C. Bridge, discusses the medical aspects of the new Act. An important provision empowers the Secretary of State to require reasonable arrangements to be made for medical supervision when he has reason to believe that cases of illness are due to the nature of the work or where there may be risk to health from the introduction of a new process or new substance for use in a process. Another important change relates to certificates of fitness. Young workers will now be examined not only for fitness but with a view to determining the work for which they are suitable. The practitioners appointed for this purpose are to be designated "examining surgeons," in place of the old-time title of "certifying surgeons." In his report on industrial diseases Dr. Bridge notes that there has been some increase in cases of epitheliomatous ulceration brought to light by thorough medical examination. Cases of carbon monoxide poisoning have likewise increased, and this was chiefly due to the larger number of blast furnaces now being worked. Deaths from silicosis and silicosis combined with tuberculosis showed no sign of reduction, while the number of cases of dermatitis—which are voluntarily reported—was 12 per cent. greater than last year. Though the medical report is not encouraging, that relating to "welfare" is more pleasing, and an increasing number of small employers show an appreciation of its practical value. For instance, it is found that in areas where the shortage of labour is acute factories with good welfare conditions have long waiting lists and are able to recruit the best workers, while the less enlightened employers are left to scramble for the remainder. The extraordinary advance made by the welfare movement in recent years is illustrated by the record of a firm which had been satisfied with two wash-basins for the 2,000 men in the chromium-plating department of its old factory, but which has excellent washing accommodation in its new works. Many new mess-rooms and canteens are now being built throughout the country, and the "Milk-in-Industry" scheme is meeting with great success. It is now in operation in nearly 7,000 factories employing 2¼ million workers.

Under the new Act the hours of employment have been substantially reduced, the legal hours of sixty per week in non-textile factories and fifty-five and a half in textile factories being reduced to a uniform forty-eight hours. It is true that most trades had already adopted a week of forty-eight hours or less, the printing trade having one of forty-five hours, the boot and shoe trade one of forty-six hours, and the flour-milling trade one of forty-two or forty-four hours. Nevertheless, certain groups of employers had retained a normal working week of fifty-four and a half or fifty-five and a half hours, so it is well that they should be made to conform more closely with current custom. Also a few of them were guilty of flagrant infringements of the hours legally permitted. An instance is noted of the women and girls in a laundry who were compelled to work eighty-four hours a week, and another of a firm of bakers who, in the week preceding the Coronation, employed women and young persons from 6 a.m. to midnight on each day of the week. Fortunately such occurrences are very infrequent, and there can be no doubt that the great majority of employers will loyally endeavour to carry out the requirements of the new Act.

INSURANCE FOR THE MEDICAL PROFESSION

The Representative Meeting of the British Medical Association at Belfast in 1937 instructed the Council to devise some method of impressing upon the recently qualified and the junior practitioner the importance of adequate life assurance. The Council referred the problem to the Organization Committee, which got in touch with the Medical Insurance Agency; and the result is the appearance in this week's *Supplement* of the first of a series of three articles contributed by the

Honorary Secretary of the Agency, Dr. Henry Robinson, which deal not only with life assurance but also with pensions, sickness, motor-car, and, in fact, all the insurances needed by the profession. The scope of the articles is necessarily elementary, but the series may be commended to the attention not only of those for whom it is primarily designed but also of more senior practitioners. Especially to be noted is the insistence rightly laid upon the importance of transacting all insurances of every kind through the Medical Insurance Agency, which itself came into existence thirty-one years ago by a happy conspiracy on the part of the late Editors of the *British Medical Journal* and of the *Lancet*, Sir Dawson Williams and Sir Squire Sprigge. The benefits which the Agency has rendered to the profession are outstanding; but even now they are not so widely taken advantage of as they should be, a state of affairs which it is hoped this series of articles may speedily improve.

EXPERIMENTAL INTERRUPTION OF PREGNANCY

The clinician at present has at his disposal only such oestrogenic preparations as are derived from natural sources—namely, oestradiol, the hormone actually secreted by the follicle, and its two degradation compounds, oestrone and oestriol. The scope of activity of these substances is fairly well defined. The atrophic uterus of amenorrhoea may be restored to normal dimensions and oestrin withdrawal bleeding induced. Spasmodic dysmenorrhoea, uterine inertia, and atrophic vaginitis may all be successfully treated, but injection of the material is usually required. Oral effectiveness is limited to the relief of menopausal symptoms. The principal measures introduced to prolong the effect of the injected hormone are esterification of the hormone with benzoic acid and the subcutaneous implantation of tablets of the pure crystalline material.[1] The latter has been found to produce an oestrogenic effect which may last for six weeks to three months.[2] Progesterone and testosterone have for some time been available in synthetic form. Oestradiol and its derivatives, on the other hand, have not been synthesized. During the past year or so, however, synthetic compounds have been prepared which show oestrogenic properties to a varying extent. These compounds, it should be emphasized, bear little relation chemically to the naturally occurring sex hormones, which are *cyclo*-pentenophenanthrene derivatives. One such synthetic compound with potent oestrogenic properties, diethyl-stilboestrol, has been prepared by Dodds and his colleagues and is a derivative of the relatively simple aromatic substance stilbene. It is highly active by mouth and can induce a number of oestrogenic effects. The fact that it is chemically unrelated to oestrin, however, makes it possible that its effects may not exactly correspond either quantitatively or qualitatively to those of the naturally occurring hormone. In the current issue of the *Journal* (p. 557) Parkes, Dodds, and Noble report on the potent anti-progesterone effect of the oral administration of this synthetic compound, which is capable of preventing nidation of the fertilized ovum and of causing interruption of established pregnancy in experimental animals. The application of this work to the human female may open up the most important possibilities, and it seems likely that hormonal prevention and termination of pregnancy are within sight, though a considerable amount of careful clinical investigation, such as is being undertaken at the present moment, is needed before any definite statement can be made on this matter. The other substance investigated by Parkes, Dodds, and Noble is ethinyl oestradiol. The addition of the ethinyl group to the sex hormones has been found to increase their oral effectiveness very considerably. Ethinyl oestradiol, for instance, is seventeen times more effective by mouth than oestradiol. Ethinyl progesterone is also active by this route, though progesterone itself has to be injected to produce any result at all. Oral administration of the ethinyl oestrogen appears to antagonize progesterone even more effectively than oral administration of diethyl-stilboestrol. The future application of these two compounds will be watched with much interest.

[1] Parkes, A. S., *British Medical Journal*, 1938, **1**, 371.
[2] Bishop, P. M. F., Ibid., 939.

IMMUNIZATION AGAINST SCARLET FEVER

Active immunization against scarlet fever is not very popular, largely because many injections—usually five—are needed, because reactions which may interfere with work or school often occur, and because protection cannot be as fully assured as in the case of immunization against diphtheria. Collins,[1] studying 8,000 families in eighteen States in the U.S.A., characterized as "surprisingly large" the low immunization rate of 4 per cent. of children aged 10 to 11. In Philadelphia, in a population of almost two millions, only 5,500 children are recorded as having been immunized in four years. Place[2] notes that in Boston from 1913 to 1924 eighty-seven nurses among a staff of 1,009—that is, 8.6 per cent.—developed scarlet fever. This figure agrees well with those collected some years ago for English hospitals and by the Drs. Dick in the U.S.A.[3] From 1925 to 1936, when active immunization had been adopted, 1,446 nurses served in the wards of the Boston Hospital and only 1.3 per cent. contracted scarlet fever. After elimination of those who did not undergo the full course of five injections three nurses alone remained who had been "immunized" and yet developed the disease subsequently. It is of interest that in the first twelve-year period 6.44 per cent. suffered from streptococcal infections such as tonsillitis, septic throat, erysipelas, and peritonsillitis, while in the second twelve-year "immunization" period no evidence of increase was found which suggested that scarlet fever was occurring in unrecognized form—and there was a reduction to 4.66 per cent. Much energy has been spent in attempts to make immunization more popular. Kern[4] and co-workers aimed at the avoidance

[1] *Publ. Hlth. Rep.*, Wash., 1938, **53**, 409.
[2] *Amer. J. publ. Hlth.*, 1938, **28**, 137.
[3] *Edinb. med. J.*, 1934, **41**, 1.
[4] *J. Allergy*, 1938, **9**, 132.

of reactions by giving small doses intracutaneously; they state that no disability was experienced after the injection, but describe swellings from one to three inches in diameter and occasionally larger. Of 140 children receiving from three to ten doses 90 per cent. became Dick-negative, yet curiously enough only 40 per cent. of forty children available for re-test six months later remained negative. Two children who developed "miniature scarlet fever" with rash and pyrexia after injection did not rapidly become negative. Formalinization of toxin promised to be helpful, though the results obtained by Toyoda and his collaborators[5] suggested that one cannot turn toxin into "toxoid" without lowering its immunizing power, and Dr. and Mrs. Dick[6] were of opinion that whatever immunizing power "toxoid" possessed was derived entirely from remnants of unaltered toxin. Anderson[7] recalls that Veldee reported that 80 per cent. of children became Dick-negative after three injections of his toxoid. Anderson observed some 8,000 children injected with three doses of "toxoid." Discussing reactions, he notes a "really popular acceptance" owing to the rarity of reactions. Incidentally, he says that the immunization produced no more severe reactions than followed the use of diphtheria toxoid, the reaction rate for which, by the way, is generally quoted as being about 10 per cent. However, only 52 per cent. of the 4,783 Dick-positive children became negative, the variations in different groups being from 21 per cent. to over 60 per cent. Medical men will feel that a 50 per cent. conversion is not high enough to justify the work and cost necessary to persuade the public to adopt eagerly or even willingly the use of toxoid, but will continue to hope for some new discovery that may yield an improved immunizing agent. It may be that Faragó[8] has begun this promising journey with purified toxin adsorbed on aluminium gel, given in three doses and yielding a high conversion rate to the Dick-negative condition. About half the children showed no reaction, but in ½ per cent. scarlatinal rashes developed.

PHARMACOLOGICAL ACTIONS OF ANALEPTICS

Both coramine and cardiazol, particularly the former, have attained clinical popularity in this country and have to a large extent replaced strychnine as analeptics. Those familiar with pharmacological literature will know that the evidence regarding the action of these drugs is very contradictory and confusing. A review of this evidence, compiled by Professor Hildebrandt of Giessen, is therefore of exceptional interest. The names coramine and cardiazol suggest a direct action on the heart, but with both drugs the weight of reliable evidence for such an effect is doubtful if not definitely negative. Both are stimulants of the central nervous system. This is clearly demonstrated by the convulsive action of toxic doses, while therapeutic doses stimulate the respiratory and vasomotor centres. This stimulant action has been measured in a semi-quantitative manner by determining the dose needed to antagonize narcotics and particularly barbiturates. The evidence, as summarized by Professor Hildebrandt, shows that cardiazol is a more powerful antagonist to narcotics than is coramine. The summaries of the literature suggest that Swiss authors have tended to support coramine, while cardiazol has found favour in Germany. To several American workers, however, cardiazol is apparently superior to coramine, and picrotoxin to both. The clinical popularity of analeptics seems, therefore, to bear little relation to the results of pharmacological analysis of their actions.

CATARRHAL JAUNDICE

Dr. C. E. Lakin's opening paper in the discussion at Plymouth on toxic and infective jaundice, reported in our issue of August 27,[1] gives cause for much thought and renews interest in that important and elusive condition—catarrhal jaundice. Even the name is under a cloud. Though some authorities still speak of catarrhal jaundice, either sporadic or epidemic, others would do away with this name entirely and substitute for it that of subacute infective hepatitis or hepatic necrosis. Dr. Lakin considers the possibility of separating two forms of catarrhal jaundice, as has been suggested by Hurst, but finds it difficult to distinguish between a type due to blocking of the common bile duct secondary to a gastro-duodenitis and a type due to a true hepatitis. Many observations suggest that the majority of cases of so-called catarrhal jaundice are in fact of the nature of a mild subacute hepatic necrosis. In a very few patients the clinical and pathological picture of an acute yellow atrophy appears to supervene directly upon what at first begins as a simple catarrhal jaundice. In catarrhal jaundice—or epidemic hepatitis—there appears to be an incubation period of about twenty-one days, and fever at the onset suggests an infective cause. In support of this view come some careful and interesting studies from Copenhagen by Drs. Anderson and Tulinius.[2,3] These workers have investigated hepatitis in pigs and other animals, as well as in man. By feeding to healthy pigs the liver from pigs suffering from porcine hepatitis they have been able to cause gross changes in the livers of the animals tested, together with jaundice: such transmission was possible from pig to pig and occurred consistently in nine experiments. The next step in these researches was the withdrawal of duodenal juice from patients suffering from clinical epidemic jaundice. Of seventeen pigs to which this juice (from thirteen different patients) was fed ten showed changes corresponding exactly to those of porcine hepatitis; in one the result was doubtful and in six it was negative. Retransmission of this human hepatitis to a second pig has hitherto been successful in only one case. The occurrence of liver changes in

[5] *Exper. Res. Scarlet Fever*, 1929, Dairen, Manchuria.
[6] *J. Amer. med. Ass.*, 1934, **103**, 1362.
[7] *Amer. J. publ. Hlth.*, 1938, **28**, 123.
[8] *Z. ImmunForsch.*, 1938, **92**, 220.

[1] *British Medical Journal*, 1938, **2**, 437.
[2] *Acta med. scand.*, 1938, **95**, 497.
[3] Ibid., 1937, **93**, 209.

these experiments seemed to depend upon the liver or duodenal juice being taken from the jaundiced pig or patient early in the disease. Careful bacteriological examinations appear to have excluded any known species of bacteria as a cause: Weil's disease was excluded serologically, and in nine control experiments with healthy pig's liver and normal human duodenal juice no comparable hepatic changes were found. Similar transmission appears to be possible in the rat, and this work is perhaps the first which has shown direct transmission of "hepatitis" from one animal to another. Anderson suggests that epidemic hepatitis in man is probably an infective condition acquired through the alimentary tract, possibly from an animal jaundice, as in the jaundiced pigs used in his experiments. This work is undoubtedly of great interest, and gives hope of further investigation and study of a condition in man which, though often regarded as trivial, may nevertheless in some cases be attended by serious sequelae and complications.

"INFLAMMATORY CARCINOMA" OF THE BREAST

"Inflammatory carcinoma" is one of the many terms applied to carcinoma of the breast with inflammatory signs in the overlying skin; the well-known "peau d'orange" is one of its manifestations. Taylor and Meltzer[1] give a comprehensive account based on thirty-eight personally observed cases and a review of the literature. In their experience inflammatory carcinoma is not rare, constituting about 4 per cent. of all cancers of the breast. It has much the same age distribution as other cancers of the breast but is rare over the age of 70. An association with pregnancy and lactation, responsible for the term "lactation cancer," is far from constant. At least two clinical varieties of the disease are distinguishable. In one variety a cancer of the breast and inflammatory signs in the skin become evident at the same time; in another, inflammatory signs appear abruptly in a breast which has long contained a scirrhous carcinoma, or in the other breast, or sometimes after mastectomy for scirrhous carcinoma. The inflammatory signs consist of redness, heat, oedema, orange-peel appearance of the skin, diffuse and ill-defined swelling, and sometimes pain and tenderness, but all are not observed together in every case. These signs, and some histological features which have been described as "inflammatory," are almost certainly attributable to lymphatic blockage. There is general agreement that the essential process is a continuous permeation of subepidermal lymphatics by cancer cells. There is no true inflammation, and, in the absence of complications, there are no signs of toxaemia. The term "inflammatory carcinoma," therefore, is not entirely satisfactory. The disease commonly develops in obese women with fatty pendulous breasts. Pregnancy and lactation predispose to it, but there is no evidence that the action of hormones can be impugned. Lymphatics are abundant and fibrous tissue is relatively sparse in the lactating breast, and similar conditions obtain in less degree in the large fatty breast; it is probably these which predispose to inflammatory carcinoma. Early and extensive lymphatic dissemination occurs within the breast and beyond it, and the sclerosing lymphangitis which accompanies ordinary cancer of the breast is notably lacking. The histological type of the cancer is not constant. It seems that the distinctive behaviour can be impressed on all kinds of mammary cancer. If it be true that some women's tissues, especially the lymphatics, are so constituted that cancers which are not intrinsically exceptional behave in a peculiarly dangerous way, it is equally true that the obstacles in the way of successful treatment are formidable and complicated beyond the ordinary. Hitherto the results have been almost always bad. Radical excision has cured isolated cases. Irradiation produces excellent immediate effects and valuable palliation, but the later course is invariably bad, and multiple irradiations must be given cautiously on account of their liability to produce severe, even fatal, reactions. The potentialities of combined irradiation and surgery have not been fully explored, and radical excision after a preliminary irradiation is perhaps the most hopeful method, but with present resources the chances of curing this type of cancer of the breast are distressingly small.

[1] *Amer. J. Cancer*, 1938. **33**, 33.

THE WELTMANN REACTION

In 1930 Weltmann introduced a serum-coagulation reaction which in his view indicated whether a pathological process was exudative or fibrotic; he did not claim that the reaction was specific for any particular disease. It is performed by adding 0.1 c.cm. of unhaemolysed serum to each of ten tubes containing 5 c.cm. of a calcium chloride solution of decreasing strength—from 0.1 per cent. to 0.01 per cent. The tubes are shaken and placed in a boiling-water bath for fifteen minutes. The contents of the tubes are then inspected and may be found clear, turbid, or showing flocculation. The number of tubes in which coagulation occurs is known as the "coagulation band" of the serum tested. In normal serum the first six tubes show flocculation, and the normal coagulation band is therefore 6. If the coagulation band is less than 6 the reaction is said to show a shift to the left, and if 7 or greater, a shift to the right. S. A. Levinson and R. I. Klein[1] conclude that, in general, acute inflammatory and exudative conditions give a shortened coagulation band or a shift to the left, whereas in chronic diseases characterized by fibrotic changes, in the healing stage of acute infections, and in parenchymal liver damage, the band tends to lengthen or shift to the right. It does not always run parallel with the sedimentation rate. In tuberculosis the authors found the Weltmann test "a guide in the course of and in the prognosis of the disease," but they admit that "when exudative and fibrotic changes occur in the lung at the same time, as happens frequently in tuberculosis, the Weltmann reaction may not be of great assistance." A correlation was found between the blood *p*H and the reaction.

[1] *Amer. Rev. Tuberc.*, 1938, **37**, 200.

SURGICAL PROCEDURES IN GENERAL PRACTICE

This is one of a series of articles contributed by invitation

DISLOCATIONS AND FRACTURES OF THUMB AND FINGERS

BY

DAVID TREVOR, M.S., F.R.C.S.

[*Concluded from August 27, p. 462*]

Fractures of the Phalanges

All three phalanges of the fingers and either phalanx of the thumb are liable to be broken, the terminal and proximal being more commonly affected than the middle phalanx. Indirect violence generally accounts for fractures of the proximal phalanx, while direct violence is the common method whereby the terminal phalanx is fractured. Further, as the terminal phalanx is fairly close to the dorsal surface of the finger the fracture is often an open or compound variety.

The proximal and/or the middle phalangeal fracture is sometimes angulated anteriorly; in the case of the proximal phalanx the deformity is due to the action of the lumbricals and interossei muscles, while fractures of the middle phalanx are angulated by the pull of long flexor tendons.

In the treatment of phalangeal fractures it is important to realize the anatomical fact that the posterior osseous wall of the flexor tendon sheath of the fingers is formed

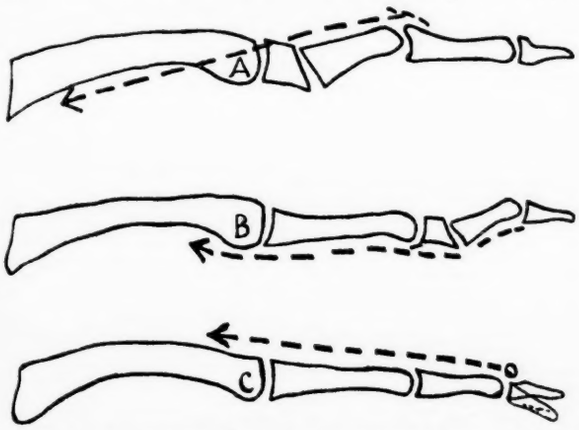


FIG. 1.—A, Fracture of proximal phalanx. Forward angulation caused by pull of the interossei muscles, together with the "lumbricals." B, Fracture of middle phalanx. Forward angulation caused by the pull of the long flexor tendons. C, Avulsion of a piece of bone from the dorsal aspect of the base of the terminal phalanx: this will cause a type of mallet-finger.

by the anterior surface of the proximal and middle phalanges: thus it will be obvious that any forward angulation will diminish the space of the tunnel and cause serious interference with the working of the flexor tendons. This anterior angulation, if present, *must* be fully corrected.

Any fracture of the proximal or middle phalanx, and dislocation or fracture-dislocation of the interphalangeal joint, should be treated with the affected finger immobilized in flexion. Study of the anatomy of the knuckle-joint supplies the reason. On either side of the metacarpo-phalangeal joint there is a strong lateral ligament, attached nearer to the narrower dorsal aspect of the head of the metacarpal bone than to its wider palmar aspect. With the finger in a straight position these ligaments are relaxed, allowing it to have much lateral mobility and rotation, but when the finger is flexed the lateral mobility and rotation practically cease, on account of the lateral ligament becoming stretched by flexion of the metacarpo-phalangeal joint. Again, when a finger is immobilized with the metacarpo-phalangeal joint in a straight position the lateral ligament becomes contracted in a relaxed position; this gives rise to stiffness of the knuckle-joint in an extended position, and flexion is regained very slowly; often full flexion is not restored, with the result that some partial permanent disability remains.

Treatment

In the treatment of a fracture of either the proximal or middle phalanx, with displacement, local or general anaesthesia is used as the occasion demands. Reduction is effected by long-axis traction of the affected finger, and this must be maintained throughout until the fracture is securely fixed: an assistant applies countertraction to the upper part of the forearm. This will correct any *overlap* of the fragments, while local pressure, laterally and antero-posteriorly, at the site of fracture with the finger partially flexed will correct any *displacement*. An unpadded plaster-of-Paris slab is then applied to the dorsal aspect of the forearm from the region of the elbow to just distal to the knuckles: the slab is fixed to the limb with a circular plaster-of-Paris bandage so that the wrist-joint is securely immobilized but no plaster fills the palm of the hand. A padded metal splint about three-quarters of an inch wide, suitably bent to the front of the distal three-quarters of the forearm, the wrist, and the affected finger, is then incorporated in the plaster. The finger is finally fixed to the bent splint by either adhesive strapping or plaster-of-Paris, so that the middle phalanx is nearly parallel to the metacarpal bone; the tip of the finger should be uncovered, so that the circulation through the finger can be observed (Fig. 2). There

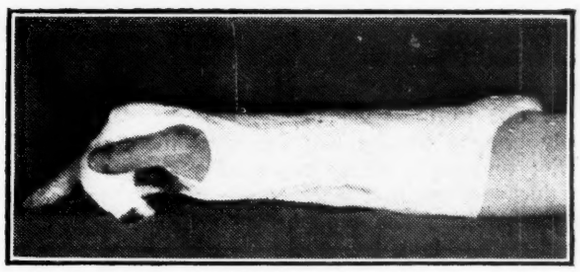


FIG. 2.—Fracture of middle phalanx of index finger immobilized in a flexed position in a finger splint which has been fixed to the forearm by plaster-of-Paris.

is no need for continuous traction exerted through the pulp of the finger: the danger occasionally seen resulting from the use of this "continuous traction" method is over-extension, with separation of the fractured surfaces.

In terminal fracture the phalanx is immobilized on a straight thinly padded metal splint, slightly wider than the finger and extending on the palmar surface from just beyond the tip up to, but not including, the metacarpo-phalangeal joint. The splint is attached to the finger by means of adhesive strapping. Occasionally a small

"chip" fracture of the dorsal aspect of the base of the terminal phalanx occurs, giving rise to a type of mallet-finger. Here the finger should be immobilized with the distal interphalangeal joint slightly hyperextended (Fig. 3).

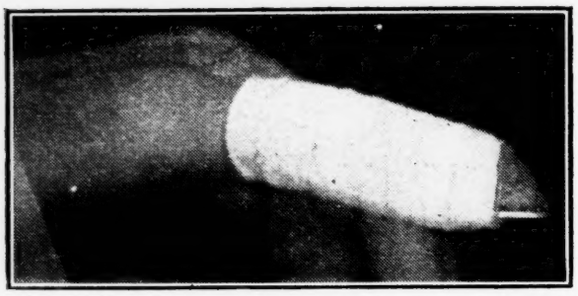


FIG. 3.—Avulsion of a piece of bone from the dorsal aspect of the terminal phalanx treated on a straight splint, with the terminal interphalangeal joint hyperextended.

Chip fractures of either condyle of the head of the proximal or middle phalanx should be treated on a straight splint in the same fashion as an ordinary fracture of the terminal phalanx.

The period of immobilization for these phalangeal fractures varies from four to six weeks. During this period the unaffected fingers are freely used to their full extent: it is important to impress upon the patient that the more the unsplinted fingers are used the quicker the function of the hand and of the splinted finger—or fingers, as the case may be—will be regained.

Dislocation of the Metacarpo-phalangeal Joint

Any of the metacarpo-phalangeal joints may dislocate: that of the thumb is the commonest. The injury occurs from indirect violence, and the usual resultant deformity is backward displacement of the base of the proximal phalanx, while relatively the head of the metacarpal bone goes forward. The dislocation can be reduced by the manipulative manœuvre of long-axis traction, against resistance, of the thumb, which is then strongly flexed at the knuckle while the traction is maintained. Fixation of the thumb should then be performed by applying plaster-of-Paris for two to three weeks, including the wrist-joint, and up to, but not including, the interphalangeal joint of the thumb. Adhesive strapping may be used instead of plaster, but it is not so effective.

Occasionally reduction cannot be effected: this is said to be due to the head of the metacarpal bone being firmly gripped by the two heads of the flexor pollicis brevis: an equally likely explanation is interposition of the thickened anterior part of the capsule between the metacarpal head and the phalanx. If reduction by the closed method fails, then there must be resort to an open operation.

The area of operation is prepared with ether and 2 per cent. solution of iodine for at least twenty-four hours. A small incision is made on the palmar aspect of the joint and the capsule incised and strongly retracted; the dislocation is then reduced easily. Post-operative fixation of the thumb is carried out, as described, for three to four weeks—about a week longer than by the closed method.

Dislocation of the Interphalangeal Joint

The interphalangeal joints are often dislocated: a dorsal dislocation usually results, but occasionally a lateral dislocation occurs. Reduction of the dislocation is easy, especially the lateral; for frequently, in this type, the patient himself places the finger back in position before seeking advice. Dorsal dislocation is reduced, under anaesthesia if necessary—often it is not—by long-axis traction followed by strong flexion of the joint; subsequent immobilization is carried out by several layers of adhesive strapping round the finger in a flexed position for about two to three weeks. The lateral dislocation is reduced by long-axis traction and immobilized by adhesive strapping in a straight position.

Occasionally an interphalangeal joint is the site of a fracture-dislocation: in this case the dislocation is reduced and the treatment then follows on the lines of a phalangeal fracture. The prognosis in this type of injury is not good, and a certain amount of residual stiffness of the affected joint is usual.

Open or Compound Fractures

A word or two may be said about these fractures. All patients with compound fractures—even compound fractures of the fingers—should be admitted into an institution: they should not be treated as out-patients. Appropriate doses of anti-tetanic and anti-gas-gangrene serum should be given. The skin edge of the wound should be carefully excised, the wound rid of any foreign bodies and cleaned with *mild* antiseptics—for example, hydrogen peroxide, flavine, 1 in 1,000, eusol—all haemorrhage arrested, and the wound lightly approximated with interrupted silkworm-gut stitches. If the tendons have been divided, suture with fine catgut No. 0 should be done, as secondary suture is disappointing. When both flexor tendons of a finger have been divided only the profundus tendon should be sutured so as to leave enough room inside the sheath. The affected part should be immobilized on a splint in the manner described for a closed fracture, with the exception that observation of the wound can be observed without disturbing the splint. The wound should be kept as dry as possible: the best dressing for this purpose is iodoform powder or iodoform gauze.

If a piece of bone is protruding through the skin in an open fracture it may be removed so as to allow the wound to be closed, but no extensive "bone operation" should be performed—conservatism is the key-note. This applies especially to open fractures of the terminal phalanx, where bone is often exposed in a crushed fracture in the region of the nail: secondary amputation can be performed successfully at a later date if necessary.

At the end of 1936 there were in Canada 43,080 persons registered in the fifty-seven institutions for the care and treatment of persons suffering from mental diseases, of whom 39,833 were resident patients and 3,247 on parole. The net increase in resident population during the year was 1,562. The total number of patients under care was 53,326—an increase of 2,592 patients over the number under care in 1935. Of the 39,833 patients in residence, 31,268 were classified as insane, 7,711 mental defectives, 603 epileptics, and 251 all other types. The ratio of insane resident patients per 100,000 of the mean general population at the end of December, 1936, was 282.2, and for the total resident patients 359.5. First admissions numbered 9,002, or 74.4 per cent. of the total, and readmissions 2,121, or 17.5 per cent. of the total. Of the first admissions, 5,443, or 71.7 per cent., were Canadian born, 1,021, or 13.4 per cent., were British born, and 1,128, or 14.8 per cent., were foreign born. The staffs of all mental institutions numbered 7,538 and the total expenditure during the year was $14,222,138.

MALNUTRITION AMONG SCHOOL CHILDREN

The Children's Minimum Council, whose purpose it is to ensure that no child shall by reason of the poverty of its parents be deprived of at least the minimum of food and other requirements necessary for full health, has lately published a couple of pamphlets which made rather disturbing reading. They are calculated to pink official complacency on the subject of school feeding. If anybody is inclined to believe that with free meals and milk rations generally available at elementary schools malnutrition among school children has been reduced as far as is practically possible he should at least acquaint himself with the new perspective in which this council puts the matter. One of the pamphlets is entitled *Malnutrition among School Children* and the other *School Feeding in England and Wales*; both are reprinted from the Nutrition Report of the British Association for Labour Legislation, and are the work of Miss Marjorie E. Green, who is the secretary of the Council. They are published from the Council's office (72, Horseferry Road, S.W.1).

The Extent of Subnormal Nutrition

Of the children examined at routine medical inspections in 1936 the Chief Medical Officer of the Board of Education reported that 10.5 per cent. showed slightly subnormal nutrition and 0.7 per cent. bad nutrition. But do the children in these categories include all whose health or physique is suffering from lack of proper food? Miss Green speaks of "the deceptive air of mathematical exactitude which hangs about decimal places." The detection of the early signs of subnormal nutrition in clinical examination is acknowledged to be extraordinarily difficult. As Sir Robert McCarrison has pointed out, malnutrition is not itself a state of ill-health so much as the cause of many states of ill-health. In its early stages it may not give rise to any of the clinical symptoms enumerated in the Board of Education's Administrative Memorandum (No. 124), and yet it may be the cause of later disease and disability. One of the worst effects of prolonged malnutrition is that it decreases the resistance to infection and destroys the recuperative power of the body, but this is not a registrable "symptom."

The writer of these pamphlets points out the significance of the fact that wherever a more thorough examination of school children has been possible than the routine inspection (which averages only about six minutes for each child) the results show a higher percentage of defect. She instances the investigation into the health of 125 pre-school children from poorer homes in Newcastle. When they were tested by height, weight, and general appearance, twenty-five were found to be unhealthy or physically unfit, but when blood and *x*-ray examinations were undertaken the number was brought up to forty-five. In some places—Wigan, for example—special nutrition surveys which have been started on the Board of Education's recommendation have resulted in a substantial increase in the number of children judged to be in need of free feeding at school. The difficulty with these nutrition surveys, however, is that many children suffering from malnutrition may be missed in the first selection of children for the further examination. This selection is made in the classrooms and is based largely on facial expression, the least reliable of all physical signs of undernutrition.

Absence of a Normal Standard

Another difficulty in accepting the official estimates of subnormal nutrition is the absence of an objective standard of general well-being and the different interpretations put upon the word "normal." To most medical officers the word probably means some sort of average, but the way in which personal factors may influence the scale is shown in one area where the number of children classified as below normal nutrition was more than twice the number of the previous year. Economic conditions in the meantime had improved, but the reason for the different assessment was that a new medical officer had been appointed from a less distressed district. How is it that Wiltshire shows 155 times as many children in the "bad" category as the adjoining Berkshire? Why have 48.3 per cent. of the children in Smethwick "excellent" nutrition and only 1.7 per cent. of the children in Reading?

Figures from various sources are brought forward by Miss Green to suggest that the number of children who suffer from dietary deficiencies is much larger than the 11.2 per cent. of subnormals in the official assessment. She also argues very convincingly on her statistics that, unless they are having school meals, children of unemployed families are very probably undernourished, as an adequate diet cannot be purchased on the domestic budget no matter how carefully planned. She believes that perhaps 15 per cent. of school children are not only deprived of a sufficient quantity of protective foodstuffs, but are also going short of calories or bulk food, and that probably another 20 per cent., while they have a diet ample in amount, are not getting the first-class proteins, vitamins, and salts necessary for growth, good health, and resistance to disease. By simple dietary means the health of the school child could be raised to above its present level, but to bring this about a start will have to be made with the mother and the pre-school child.

School Feeding

In the other pamphlet, on the feeding of school children, Miss Green traces the development of school feeding from the haphazard efforts of the nineteenth century to the Education (Provision of Meals) Act, 1906, which gave local authorities powers to organize school feeding—powers which have remained practically unaltered to this day. Out of the 316 education authorities in England and Wales, 172 make no arrangements for meals and sixty-nine do not provide free milk. The number of children who receive free meals or free milk or both averages 8.18 per cent. all over the country. In London it is 6.46 per cent., and the average in the county boroughs is 9.47 per cent. It is a miserably inadequate provision, by whatever standard it is judged. A large-scale inquiry has shown that over 25 per cent. of children live in families in which the weekly income is 10s. or less per head. Sir John Orr found that in a sample of such families the diet was deficient for full health in every constituent examined, and especially deficient in first-class protein and the protective foodstuffs.

Even among the authorities which do give free meals or milk the proportion of children fed does not always bear relation to the probable economic need. In the areas of thirty-five authorities with exceptionally severe unemployment the proportion of children obtaining free solid meals in 1935–6 was 2.7 per cent., the same as for the country as a whole, but much lower than for other urban areas. Miss Green remarks that when one sees the barriers which have been set between the child and the provision of school meals the wonder is that so many children have them, not that so few do.

The cheap milk scheme so far as it goes has been successful, but it does not go far enough. Less than one-half the children are obtaining the milk; one-third of a pint a day is a miserable allowance, and in the great majority of schools it is available only on schooldays, which cover less than two-thirds of the year. Miss Green's proposals—which presumably have the endorsement of her council—include as a first step the provision of free milk for all children, both on schooldays and holidays. Up to a pint a day should be given to children who can take it. She estimates that the annual school consumption of milk in Great Britain would be

140 million gallons (compared with 25 million gallons at present), and that if the industry could supply the milk at one shilling a gallon the cost to the Exchequer would be about £6,500,000 per annum, as compared with a State contribution at present limited to half a million. She considers that there is a strong case also for the provision of free dinners—making the midday meal a part of the ordinary school routine and abolishing the need for any income or nutritional test. The gross cost of such provision, estimated at £36,000,000 a year, might be regarded by some as beyond the realm of practical politics at present, but on the other side must be put the saving in the cost of medical services and the gain from increased economic efficiency. She also insists that the services of trained dietitians working under the medical officer should be used as far as possible in drawing up the menus and organizing the service.

Nova et Vetera

THE MEDICAL HISTORY OF MOZART

The recent publication by Reichner of Vienna, and its forthcoming translation by the Oxford University Press, of a facsimile edition of Mozart's own catalogue of his works recalls the sad fact that the composer died in penury and was buried hastily in a pauper's grave, having dissipated both his money and his health. Wolfgang Amadeus Mozart (1756–91) forms a fascinating medical and psychological study, all the more intriguing perhaps because so many features of his story are obscure and may never be elucidated A precocious child, at the age of 4 he began to compose melodies which his father, a victim of gout, wrote from his dictation. Two years later he made his first professional tour through Europe. He had at least five attacks of infectious diseases, of which the first, in 1762, was probably scarlet fever. In 1765, while in Holland, he suffered from what is described as an "inflammatory fever" followed by a relapse—probably typhoid. At the age of 11 he contracted small-pox during an epidemic in Vienna: he was seriously ill and lay blind for nine days. His quick recovery from these diseases and his apparent enjoyment of travelling, so fatiguing in those days, indicates a strong constitution. Though physically healthy, Mozart was extremely nervous and highly strung. He had a dread of the sound of a trumpet, becoming alarmed even to see this instrument handled. At its first blast he turned deathly pale and fell to the ground in a faint. Subject to colds, he was at times greatly irritated by neuralgic toothaches.

Small and frail in body, Mozart possessed a comparatively large head and an enormous nose. His face was pale and exceedingly mobile, changing its expression every moment, though frequently he wore a vague, distracted look. An intense, playful genius, he was fond of life and of the pleasures of living. He loved dancing, billiards, and the society of fair women. Though his character on the whole was fickle, and though towards the end of his life between fits of terrible depression he indulged in wild pursuits of sensual happiness, reports of his conjugal infidelity are exaggerated. He is described as having drunk to the point of exhilaration but not beyond. Overworked and underpaid, he kept late hours composing, and gradually ruined his health.

Pathological Speculations

In his illnesses he was attended by Dr. Sigmund Barisani, a connoisseur in music, and by Gerhard van Swieten, who is said to have been a great friend of the poor, but a poor friend to the great Mozart. In 1791 the composer wrote his famous Requiem Mass in the conviction that he was dying, having been poisoned by his enemies and rivals. He was but 30 years old, and already his days were numbered. He complained of headache, and his hands and feet began to swell. At times he was unable to move, and he vomited a great deal. Several times he swooned, losing consciousness for a few minutes, but whether these attacks were simply in the nature of syncopes or were uraemic fits is debatable. Though the late Dr. James Collier included Mozart in his list of the famous who have been provedly or reputedly epileptics, for this the evidence which would satisfy the scientific mind is meagre in the extreme. His last illness has been variously termed "malignant typhus," "rheumatic fever," and "consumption," and in the official records it appears as a "cerebral fever." The post-mortem examination showed nothing remarkable beyond inflammation of the brain. No mention is made of the kidneys, which may have been overlooked or only cursorily examined. It is possible, therefore, that Mozart might have been a victim of uraemia, his kidneys having been damaged by the attack of scarlet fever in childhood.

His pauper's grave was left without a memorial, and the legend is circulated that his corpse had been violated so that a certain physiognomist might add this interesting skull to his collection. This rumour recalls a similar fate which befell the mortal remains of Josef Haydn. Two days after Haydn's burial Johann Peter, superintendent of the imperial prisons at Vienna, amateur phrenologist, stole the composer's head in order to study the "musical prominences" at the temples, and on his death bequeathed it to the Museum of the Anatomical Institute, revealing its identity. Later it passed into the hands of the city's Society of the Friends of Music, and has recently been given to Prince Paul Esterhazy, in whose family estate at Eisenstadt Haydn's headless body has lain buried for 118 years. Next spring a mausoleum will be completed in the parish church in which the remains of the composer are to be united 129 years after his death.

W. R. B.

MEDICINE IN ICELAND 100 YEARS AGO

At a meeting of the Académie de Médecine on August 4, 1838, reported in the *Gazette Médicale de Paris* of August 11, Dr. Wortenson, a distinguished practitioner of Iceland, gave the following information concerning his country. The most frequent cause of death was catarrhal fever and acute and chronic bronchitis. Phthisis, on the other hand, was very rare. The next commonest disease after catarrhal fever was chronic hepatitis, which often ended in suppuration. Recovery, however, was fairly frequent. The most remarkable circumstance in the medical topography of Iceland was the excessive and sudden variability of the temperature, which accounted for the frequency of catarrh in all diseases. Rheumatism was extremely common, and often showed an epidemic prevalence with catarrhal fever, and was in no way improved by bleeding. In spite of the habitual humidity of the atmosphere and chronic enlargement of the liver, intermittent fevers were unknown in Iceland, and, strange to say, foreigners suffering from them were cured without the aid of drugs. A very frequent and severe disease in Iceland, but confined to one part of the island, was tetanus neonatorum, which usually appeared on the sixth day after birth, and was not often fatal. Puerperal fever was rarely seen. Hydatid cysts, sometimes of considerable size, were fairly frequent, and were situated in the neighbourhood of the liver or other part of the abdominal cavity. Venereal diseases were quite unknown. Leprosy was fairly common. Plague had twice visited Iceland, but on both occasions was confined to one part of the island.

One hundred and fifty years ago David Pitcairn (1749–1809), physician to St. Bartholomew's Hospital, first drew attention to the relationship of rheumatism and heart disease. As he never published anything himself, it fell to Matthew Baillie to record this original observation in 1797.

Local News

ENGLAND AND WALES

Royal National Hospital for Rheumatic Diseases

A ball will be held on Tuesday, October 18, in aid of the rebuilding fund of the Royal National Hospital for Rheumatic Diseases, Bath, when the Duchess of Kent will attend. This hospital was founded by Beau Nash about two centuries ago, and the original buildings are now dilapidated and unsuitable for modern requirements. A new site has been obtained in the lower part of the city, and a sum of £200,000 is required for building and equipping the new institution. It is stated that only 3 per cent. of the patients come to it from the city of Bath, whereas one-fifth of the total are received from South Wales and one-sixth from the London area. The ball will be held in the historic Assembly Rooms, Bath, which have been closed and are now to be reopened. The last occasion on which a member of the Reigning House was present at a ball in Bath was in 1796 when the then Prince of Wales, afterwards King George IV, attended a ball in the Upper Rooms (the Assembly Rooms), and 1,200 people were present, a number which it is hoped to approximate on the coming occasion, in view of the fact that the hospital is truly national in respect of the wide area from which its patients are drawn. The price of the tickets is £3 3s. if bought before October 1, or six for £15 15s. They may be obtained from the Registrar's Office at the Royal National Hospital for Rheumatic Diseases, Bath. An eighteenth century interlude will be staged during the evening as an attempt to recapture the glamour of old Bath when the Rooms were originally opened.

Liverpool Psychiatric Clinic

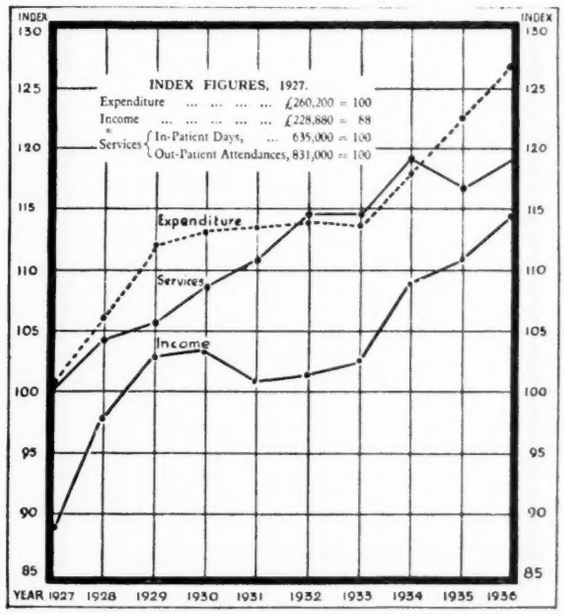
The report (1937–8) of the Liverpool Psychiatric Clinic states that the period under review has been progressive and eventful. The transference of the institution to new premises, more spacious, pleasant, and well equipped, at No. 1, Abercromby Square has facilitated a considerable expansion in the number of cases treated. Attendances reached the record total of 2,813, including 300 new patients. The report records an important addition to the medical staff in the person of Dr. Elizabeth Berndt of Berlin, a distinguished German psychiatrist and an expert in the methods of psychotherapy practised by Professor Jung of Zurich. During October, 1937, a course of lecture-discussions was delivered at the clinic, dealing with psychological medicine from the standpoint of the general practitioner. Weekly clinical demonstrations were also arranged. It is hoped further to extend the teaching services of the clinic in the near future. Among the conclusions drawn in the report it is pointed out that the high proportion of cases of adolescent instability indicates that this is a social problem for which special provision as regards diagnosis and treatment requires to be made; that a large number of the cases for which social organizations are seeking help are those of behaviour disorders in girls; and that parental loss and illegitimate birth appear to play an important part in adolescent instability.

London Hospitals Street Collections

By means of flag days organized in the streets by individual hospitals citizens of London have in the past been in the habit of contributing large sums, chiefly in pennies, for the upkeep of their hospitals. These have now been combined, and by means of the scheme that has evolved under the London Hospitals Street Collections Central Committee both in 1937 and in 1938, so far as the collections have been completed, more money has been obtained for the hospitals. The general hospitals organized their combined Flag Day in May, and arrangements for the special hospitals section on October 11 next are now being made. Already Lord Luke, chairman of the central committee, has received many valuable offers of help. Posters are being displayed by most of the local public authorities situated in the Metropolitan Police District, which comprises the area to be covered, and many large advertisers are giving similar assistance. Further publicity has again been promised through cinema theatres. Many West End hotels, business houses, and other centres have granted facilities for selling depots and collections on their premises. This year fifty-seven special hospitals are combining their flag days on October 11, as compared with thirty-three last year; nearly one hundred general hospitals combined in the May collections. Suggestions and offers of service will be welcomed by Lord Luke, at 36, Kingsway, London, W.C.2, the headquarters of the London Hospitals Street Collections.

The Merseyside Hospitals

A complete survey of the activities of the Merseyside Hospitals Council is contained in the annual report for 1937. (Merseyside in this context means Liverpool, Birkenhead, Bootle, and Wallasey.) Some idea of the extent of the work may be obtained from the fact that the council handled last year an income of £194,000. A vital part of its operations, indeed the very basis of them, is the penny-in-the-pound fund, and the increase in the contributions under this heading was £12,656. Not the least of the activities is that connected with what is known as reciprocal agreements: hospital contributory schemes in 122 other cities and towns have entered into written agreements with the Merseyside Hospitals Council to ensure



Graph depicting the increase in hospital services, income, and expenditure of the Merseyside Associated Voluntary Hospitals, 1927–36.

that the contributors on Merseyside and in the reciprocating cities and towns may have free hospital service if they need it when away from their home surroundings. Excellent results, too, have been achieved by the 700 voluntary receiving depots, established in the premises of shopkeepers, whereby 45,000 people unable to contribute to the penny-in-the-pound fund through places of employment have been enabled to buy weekly stamps near their homes and so secure the right to free maintenance on admission to hospital. But every increase in the fund adds to the responsibilities of the council, and there

is little improvement in the proportion of the cost of maintenance which it can contribute to the associated hospitals in return for the increasing volume of service they in turn give to contributors and their dependants. So long as the employed population contribute less than the cost of the service they receive from voluntary hospitals the balance must, if possible, be found by legacies and private subscriptions. The problem of hospital finance is becoming more and more acute, notwithstanding the contribution from the council's funds, amounting in 1937 to £104,656, an increase of £8,592 over 1936. In addition to this the council allocated £8,446 to the hospital visiting medical staffs in recognition of their services to contributors. The report suggests that if the voluntary hospitals system on Merseyside is to continue there must be a substantial increase in the ordinary revenue, or an upward trend in the receipt of legacies, or a curtailment of the work undertaken by the associated voluntary hospitals.

Supervisors of L.C.C. Midwives

Hitherto the L.C.C. has employed four medical officers in connexion with the supervision of midwives and allied work. One of these officers has recently retired, and another is due to retire shortly. The volume and character of the work have been considerably affected by the introduction of the council's midwifery scheme. The supervision of the domiciliary midwives appointed by the council is necessarily more complete and systematic than in the case of the independent midwives, and more detailed than formerly in the case of midwives employed by voluntary organizations. It is not possible at present to indicate the supervisory staff which will ultimately be required, but it is proposed that for the present two positions of non-medical supervisor of midwives be created in substitution for the two positions of assistant medical officer referred to above. Under the revised arrangements the two remaining assistant medical officers will each become responsible for the general supervision of the midwives in one-half of the county area. The non-medical supervisors are to receive a salary of £375-£25-£475, but if they have special experience of the specific duties concerned the first two appointments will be at the commencing salary of £400.

Medical Society of London

The first half of the session 1938–9 of the Medical Society of London will open on Monday, October 10, with the annual general meeting at 8 p.m., followed by Dr. C. E. Lakin's presidential address at 8.30 p.m. On Monday, October 24, at 8.30 p.m., a discussion on sulphanilamide, its use and its misuse, will be introduced by Sir William Willcox and Mr. Eardley Holland. A discussion on hormone therapy in gynaecological conditions will be opened by Mr. Douglas H. MacLeod, Dr. P. M. F. Bishop, and Mr. W. R. Winterton on Monday, November 14, at 8.30 p.m. A clinical meeting will be held on Monday, November 28, at 8 p.m. On Monday, December 12, at 8.30 p.m., Mr. E. Pearce Gould and Dr. T. L. Hardy will introduce a discussion on preliminary investigation in cases of malignant disease of the breast and stomach. The Lettsomian Lectures, on the surgery of the gall-bladder and bile ducts, will be delivered by Professor G. Grey Turner on February 20 and March 1 and 6, 1939. Professor John A. Ryle will deliver the annual oration on "Clinical Sense and Clinical Science" on Monday, May 8.

A new illustrated pamphlet on Torquay as a health resort and residential centre is issued by the Baths and Publicity Committee of the Corporation with the approval of the Torquay Division of the British Medical Association. Copies may be had free of charge from the general manager, Marine Spa Baths, Torquay.

Correspondence

Convalescent Serum in Infantile Paralysis

SIR,—The dogmatic statement made by Drs. Donald Paterson and Macdonald Critchley in their letter to the *Times* of August 8 seems imperfectly justified. They state: "The disease [infantile paralysis] is not one that yields to any known treatment which needs to be applied within the first few days of onset." As an orthopaedic surgeon I see so many of the tragic results of this disease that I regret this out-of-hand condemnation of early treatment, including treatment by serum, which alone seems capable—once the disease has provoked the "spinal sign"—of aiding natural resistance. I have dealt with the advantages of early absolute immobilization elsewhere (*Proc. roy. Soc. Med.*, 1922, **15**, 59). I feel that the value of convalescent human serum, which has under certain conditions (Macnamara, J., and Morgan, F. G., *Lancet*, 1932, **1**, 469, 527) given results suggesting great potency, has not been lessened by records of subsequent series of cases treated under different conditions and with different techniques, although the later series were larger and more evidential *qua* controls. My own experience with convalescent serum used on the lines suggested by Dr. Macnamara has been very happy, though relatively small and without controls. For these reasons I asked a distinguished bacteriologist if he would review the literature. He has been good enough to do so, and he writes in a covering letter: "There is little doubt that complete finality in the matter has not been achieved. The reading has shifted my view somewhat in the direction of reserved scepticism; and I think it justifiable from the clinical point of view to continue the use of serum. I think I should feel glad if it were available for any person in whom I was interested." His report is as follows:

1. In the light of the published facts any individual is justified in holding the personal opinion that convalescent serum is ineffective, because those tests that have aimed at and approximately achieved "experimental" conditions, with controls truly comparable to the treated cases, have failed to prove its efficacy; a positive proof was to be expected if serum really "works." No other reports have much evidential value, since they all make comparisons of essentially dissimilar groups of cases and are coloured by enthusiasm for a new remedy.

2. Since none of these tests actually achieved perfect "experimental" conditions, owing to the enormous difficulties and the multitude of variable factors involved, it also remains open to any individual to refuse to accept them as final. This, in fact, was the attitude of almost all of those who carried out the tests.

3. Examples of these uncertainties are the uncontrollable variation in the potency of serum samples; differences in the size of the dose and in the time and repetition of administration; and variably correct diagnosis of the pre-paralytic stage. Thus success might be dependent on these factors being exceptionally favourable, and failure inevitable if they are less favourable. This, though only a surmise, is a justifiable one.

4. The fact that each of the several determined attempts to prove scientifically the efficacy of the serum failed to do so has necessarily induced an unbelieving attitude in most detached observers, including myself, to whom the balance of probability now seems against the serum. But nothing short of a new large-scale and very perfect experimental test would justify a dogmatic statement that the serum has no value in the disease.

In my view variations such as those enumerated in paragraph 3 may well prove to be of critical importance; the following points should also be mentioned:

(*a*) The examination of muscular power should be carried out very carefully and thoroughly by someone experienced in this work if one is to be sure that the case was truly at a pre-paralytic stage.

(*b*) The serum to be used must be fresh, and must have been obtained from fairly recent (say, less than four years) convalescents from indubitable acute anterior poliomyelitis due to the same type of poliomyelitis virus—that is, it must be potent in antibodies to the existing infection.

(*c*) The serum is probably better without antiseptic preservation, because large intravenous doses of this low-titre serum must be given, and to avoid meningeal irritation from the intrathecal dose.

(*d*) There must be no delay between the diagnosis and the administration of serum. The needle used in the diagnostic lumbar puncture should not be withdrawn until, if the bedside cell count confirms the clinical diagnosis, a volume of serum a little greater than that of the cerebrospinal fluid withdrawn has been injected.

(*e*) A massive dose of this low-titre human convalescent serum must be given by intravenous administration if the antibody value is to be comparable to the dose of tetanus antitoxin recommended by Cole (*Proc. roy. Soc. Med.*, 1937, **31**, 59).

Daily contact with victims of the greatest of all physical disasters that can happen to a healthy child has made me venture momentarily out of my proper sphere, but I do appeal for a further use of potent serum without post-puncture delay and in massive doses.—I am, etc.,

Oxford, September 1. G. R. GIRDLESTONE.

"A Mere Examining Body"

SIR,—In the *Journal* of September 3 (p. 483) Sir Walter Langdon-Brown, in the course of a would-be destructive criticism of examinations in general, writes: "We had already travelled far from the point of view which underlay the original attitude of London University; indeed, it seems incredible to-day that a mere examining body should ever have been regarded as a university. The enormous building now rapidly rising in Bloomsbury shows how far London University itself has left such an attitude behind." His thesis would seem to be that because the senate house and other portions of the new headquarters of the University are approaching completion, demonstration is afforded that the attitude of the University towards its traditional examination system has radically altered. Was there ever a more absurd *non sequitur*?

I can assure Sir Walter categorically that the University's "attitude" in this respect has in no wise changed since its foundation a hundred years ago with the express purpose of bringing higher education to large sections of the community then debarred from admission to the older universities by sex, creed, or race. That it has fulfilled this high purpose to admiration throughout a century of activity is clear from the volume of appreciation from all parts of the world which it received in the centenary celebration in 1936. It is an ironical comment on Sir Walter's contemptuous reference to the University—before its reconstitution in 1900— as "a mere examining body" that it is precisely in medicine that that "mere examining body" achieved its greatest success. Its medical degrees (and all London graduates of more than forty years' standing are graduates of the "examining body" which for the past twelve years has given both the Royal Colleges their presidents) rapidly won such an outstanding prestige, both at home and in our Dominions over-seas, that the older universities, which a hundred years ago had allowed their medical degrees to become merely farcical as tests of professional competence,* were obliged to change their "attitude" to examinations in conformity with the methods and example of the new London University. The only change that the reconstitution in 1900 effected was that certain London schools were made part of the new dual University, which, however, in no sense relinquished the function previously exercised of granting degrees on examination to students whom it had not taught. This function continues to be discharged uninterruptedly by the external side of the present dual University under the general direction of the External Council. In the current year 12,800 matriculated students have been registered as pursuing courses of study for external degrees of the University—a total considerably larger than the combined student-body of Oxford and Cambridge, estimated in the University Grants Committee's latest return as 10,813 (Oxford 4,920, Cambridge 5,893). If Sir Walter objects to this principle, how does he justify the medical qualifications given by the Royal Colleges in London—which remain "mere examining bodies"—or, indeed, the practice of the older universities in granting qualifications in medicine to students whom they have not trained in the most important part of the curriculum—namely, the clinical subjects—for which the older universities uniformly send their students to the schools of London University? Sir Walter himself was taught his medicine in a London University school; he was examined at Cambridge.—I am, etc.,

E. GRAHAM-LITTLE, M.D.,
Ramsgate, September 4. Chairman of the External Council, London University.

* See Halévy: *A History of the English People in 1815*, Pelican Books, vol. **3**, pp. 178 *et seq.* "Neither University educated doctors. If future doctors spent a short period at Oxford or Cambridge it was either under the compulsion of the rules of their profession [only graduates of the ancient universities were admitted to the Fellowship of the Royal College of Physicians of London] or because it was the correct thing to do from the social standpoint. . . . At Oxford and Cambridge . . . a medical faculty was for all practical purposes non-existent, the lectures mere displays of oratory, the examinations a farce." The two Royal Colleges in London "were exclusive and reactionary corporations in close alliance with Oxford and Cambridge, not for the encouragement, but on the contrary for the obstruction, of scientific progress."

SIR,—In the course of his article on the medical curriculum, Sir Walter Langdon-Brown writes: "We had already travelled far from the point of view which underlay the original attitude of London University; indeed, it seems incredible to-day that a mere examining body should ever have been regarded as a university." Oddly enough, when the incredible University of London was chartered the University of Cambridge was also a "mere" examining body. The Colleges had already revived serious education, but the university officers, as such, had little or nothing to do with teaching; they effected their reforms by improving the system of examination. When the great scholar Porson was professor of Greek at the end of the eighteenth century his sole duty was that of examiner (see Clarke's *Life of Porson*, 1937, p. 40). Indeed, so far as concerns a large majority of its medical students, down to our own day Cambridge University has confined itself to testing their clinical proficiency. It is good fun to heave bricks at early Victorians, but more intelligent to try to understand their incredible actions. An article on London University, published seventy years ago by one of her most distinguished graduates, Walter

Bagehot, is less known than it should be (see his *Collected Works*, vol. vii, pp. 286 *et seq.*).

"Every generation is unjust to the preceding generation," wrote Bagehot. "It respects its distant ancestors, but it thinks its fathers were 'quite wrong.' . . . Just so with London University. We, who were educated at it, grumble at much of it. I at least have often done so, and have often heard others. But yet I know well how much the founders of the University have done; how difficult in their case was every sort of success; how easy every sort of failure. . . . Thirty years ago it was a great step to establish an independent and examining University. That improvement was a purely English idea, but, like so many English ideas, it existed only in solution; it was there but it was hidden."

He goes on to explain why this was a great step, and why it was impossible to do more.

In 1938 we can do things which were impossible in 1836 and difficult in 1868, but that is no reason for sneering at what was done in 1836. Horses are not incredible means of transport because we have aeroplanes; people did travel, and travel far, on horses before we had aeroplanes, and there are still parts of the world where one must travel on horseback or not at all. Nobody with educational experience needs to be reminded of the defects of "mere" examinations, but the educational system of a great Empire presents simultaneously different levels of development. At one level an impartial system of "mere" examinations is a valuable instrument of progress. That level exists in many places still, and education still owes much to the incredible system of 1836.—I am, etc.,

Loughton, Sept. 5. MAJOR GREENWOOD.

Bennett's Fracture

SIR,—Two communications published in the *Journal* of August 27 were of personal interest to me. The one on fractures of the thumb and fingers by Mr. David Trevor (p. 461) was useful and instructive for others in addition to those for whom it was intended. It was particularly so to myself, for I sustained a Bennett's fracture of the thumb in 1931, which disabled me for twelve months. The other communication was from Mr. J. C. Nicholson on fracture of the neck of the femur, with an account of his personal experiences during treatment (p. 464).

At the time of my comparatively trivial accident I thought, as Mr. Nicholson thinks, that the personal experience of a surgeon as a patient is helpful in the treatment of others, and I published "the case." Mr. Nicholson believes, as I did, that it is of value if treatment is approached from the patient's rather than from the surgeon's point of view. He describes vividly his reactions to sandbags, to weight extension, plaster-of-Paris, and nailing. He makes interesting comments on the various stages of a prolonged and trying ordeal. We read recently, from the pen of a surgeon, the tragic sequence of events after he had undergone treatment with radium for carcinoma. I hope we will have further opportunities to study the comments of patients who belong to the ranks of the medical profession. By such a study our judgment is reinforced and our methods of treatment become more elastic and adjusted to suit the individual case. To emphasize the importance of matters which are often regarded as side issues during the treatment of our patients I give a short account of my own experiences after sustaining a fracture-dislocation of the thumb. Following the accident I realized that permanent incapacity as a surgeon might result. The literature teemed with references to permanent disability, even when reduction of the fracture was complete.

The displacement was reduced under local anaesthesia, and subsequently was readjusted under a general anaesthetic. The treatment was undertaken by an expert, who obtained perfect reduction, and for whom I have the greatest regard. The thumb was held in orthodox fashion—abduction and extension—by plaster-of-Paris in which a wire gallows was incorporated. About a fortnight later, probably through some fault of my own, the plaster lost its grip and the fragments slipped. The plaster was removed. The thumb felt now as it did before reduction: as if a pair of scissors could never be employed, as if the tying of ligatures would prove impossible, and as if securing a vessel with forceps was out of the question. Attempts to oppose the thumb to the other digits were futile. The tip of the thumb could just approach the side of the index finger and no more. I reflected on the many times I had taught students that a hand without a thumb was little better than a hook. We forget, but the patient cannot do so, that disablement of one thumb reduces the utility of the other hand by about 50 per cent. Collar studs, bootlaces, and braces were among the many trivial items which become unmanageable. No further attempts were made at reduction. Hope eternal rested upon occupational treatment. The hand was immersed in a basin of water at a high temperature in which lay various surgical instruments. Feeble efforts were made many times a day to open and close forceps, to tie ligatures, and to divide them with scissors. In the intervals, with the support of a tight elastic dressing, the thumb was coaxed to perform other duties. After seven weeks with the support *in situ*, reinforced by two rubber gloves, a minor operation was attempted with the aid of a colleague. It was a child-like performance. Pain and awkwardness persisted for six months, but after twelve months all disability had disappeared.

I can well understand Mr. Nicholson's strong objection to a big hip plaster, and I was impressed with the emphasis of his condemnation. In a minor way I suffered from similar discomforts.

At one time, about thirty years ago, I saw plaster applied to all and sundry, and it was used largely for the ambulatory treatment of fractures. In recent years there was a revival owing to the obvious merits of the methods described by Böhler. Nevertheless experience has encouraged me to employ more frequently the splints and appliances recommended by the late Sir Robert Jones. The contraindications to the use of plaster became more apparent. At the time of my injury I knew of no efficient splint for Bennett's fracture. I designed a simple apparatus, which has proved useful in practice. Briefly, it is an aluminium gutter splint with a large aperture at the distal end. It is applied laterally to the forearm with the thumb protruding through the aperture. A wire gallows is attached which maintains the thumb in extension and abduction. The method of reduction and application of the splint has been described (*Med. Pr.*, July, 1933, p. 90; *J. Bone Jt. Surg.*, **19**, April 2, 1937). The treatment advocated by Mr. Trevor has powerful support, but as a patient I would have pleaded with him against the stirrup transfixing the pad of the thumb as a means of extension. These stirrups are made to perfection, but I have always disliked skeletal traction, extension from the finger-nails, or transfixion of the soft parts, as regards the thumb and fingers. Transfixion of the thumb may give an eerie feeling to a surgeon when he is the patient. Simple adhesive strapping and tapes, or one of the many finger extension traps, suffice as a rule.—I am, etc.,

London, N.W., August 28. W. I. DE C. WHEELER.

Treatment of Ganglion

SIR,—I read with great interest and profit Mr. E. Pearce Gould's excellent article on the treatment of tenosynovitis and ganglion in the *Journal* of August 20 (p. 415). There

are a good number of cases of ganglion which do not respond to the thumb pressure method, and the patients object to the scar of a dissection. I have found that the old-fashioned seton is most useful. Depending on the size of the ganglion, one, two, or three silkworm-gut sutures are passed through the ganglion at intervals of about a quarter of an inch. Each suture is knotted to form a loop of about 1 inch in diameter and is drawn through about half its circumference daily. A good deal of the jelly comes away on passing the sutures and leaks into the dry dressing afterwards. The sutures set up a reaction in the tissues of the ganglion and the space is obliterated. Whether this reaction is a septic or aseptic one I do not know, but I have never seen pus formation. Failures are few. The silkworm-gut is usually removed about the seventh day, and the only scar is a white puncture mark at the site of the stitch holes. I have never seen a simple ganglion in the front of the wrist, so the above remarks do not apply to that site.—I am, etc.,

Longtown, Cumberland, August 20. R. RUTHERFORD.

Reduction of Backward Displacement in Colles's Fracture

SIR,—I was much impressed with Mr. R. A. Fitzsimons's article dealing with Colles's fracture (*Journal,* August 13, p. 357). He rightly stresses that the majority of unsuccessful attempts at reduction are due to the application of insufficient force rather than to insufficient skill, but he then goes on to say: "There is no danger of over-reduction of backward or outward displacements." Strengthened with this statement I reduced in this hospital, under a local anaesthetic, a severe Colles's fracture with much backward and outward displacement, and after a plaster had been applied a radiograph was taken which showed the fracture had been over-reduced, and had, in fact, been converted into a Smith's fracture. Hence I would point out there is a danger of over-reduction.—I am, etc.,

Eastbourne, August 22. M. F. MAGNIER, M.B., B.Ch., House-surgeon, Fracture Clinic, Princess Alice Memorial Hospital.

Sulphonamide Chemotherapy in Gonorrhoea

SIR,—I was greatly interested to read the observations of Dr. G. L. M. McElligott and Mr. A. J. Cokkinis in the *Journal* of August 20 (p. 424) on the comparative results of treatment of gonorrhoea with sulphanilamide, uleron, and M. & B. 693. I have used all these drugs in a fairly large number of patients suffering from acute gonorrhoea, mostly in male cases. My experience has shown that sulphanilamide is much the most toxic of the three drugs, that uleron is relatively non-toxic, and that M. & B. 693 is only slightly toxic. With all three drugs I have never seen a case of toxic neuritis; but then, like Dr. Hanschell's, most of my patients have been seafarers, and possibly they may have developed neuritis after their return to sea.

In my experience sulphanilamide produces toxic reactions of varying degrees of severity in a high percentage of cases, so much so that many patients have to stop taking the drug or drastically reduce the dosage. The usual dosage which has been adopted is that advocated by Dees and Colston—5 grammes daily for two days, 3.5 grammes daily for the next three days, and 2.5 grammes up to the thirteenth day.

Uleron was used in another series of cases using the "stoss" dosage of six tablets daily for four days repeated after an interval of six days. The results were for the most part disappointing, relapse being quite common. In many cases the discharge cleared rapidly, but the urine contained many pus threads from infected Littré glands. Toxic reactions were almost non-existent, and when present were very slight.

M. & B. 693 was used in a further series of cases, the dosage being six tablets daily for five days. If a good response was not obtained in this time further treatment with the drug appeared to be of no avail. Toxic reactions were more frequently seen than with uleron but much less frequently than with sulphanilamide. The commonest was severe headache, which persisted for at least twenty-four hours after stopping the drug. The results obtained were definitely superior to those obtained with either of the other two drugs.

With all these drugs results vary considerably, and it is difficult to explain why two cases of acute early gonorrhoea should respond so differently to the same treatment. One can never be sure that any particular case will respond at all. It would appear that littritis is much more frequently seen as a complication in patients treated with these drugs alone than in those cases who are given irrigations in addition. Perhaps, after all, the ideal method may prove to be irrigation for the first couple of weeks followed by one or other of these drugs. The diversity of the published results would appear to suggest that much more research has still to be done.—I am, etc.,

Liverpool, August 22. ERNEST E. PREBBLE.

SIR,—We are both grateful for and gratified by Dr. H. M. Hanschell's kind appreciation of our paper in the *Lancet* of August 13 (*Journal,* August 27, p. 474). The already inordinate length of this article was the only reason why we did not add an account of our uleron cases, but we hope soon to be in a position to publish a comparative analysis of our cases treated by sulphanilamide, uleron, and T 693. However, we feel we must rise to the fly (or is it red herring?) so aptly cast by our friend Dr. Hanschell, to the extent of giving a few figures of our first hundred consecutive cases treated with uleron.

Of the hundred cases, eighty showed initial improvement amounting to apparent cure, while twenty failed to respond at all to the drug. Coming to final figures, and excluding eighteen who defaulted or were transferred during tests of cure or the follow-up period, 44 per cent. were discharged as cured, while 56 per cent. proved to be final failures. While not attempting a detailed analysis in a letter, our total experience indicates that the response of gonococcal infections to uleron is much more capricious than that to sulphanilamide. The stage of the disease, the daily dosage, the length of continuous administration, the number of "stosses" or the intervals between them, appear to play little part in determining the final result. Indeed, some of our most spectacular cures have occurred under unfavourable circumstances (first week of disease) and with minimal dosage, while there were many disappointing failures after adequate dosage, given in multiple "stosses," in the subacute and chronic stages of the disease.

With regard to our five cases of peripheral neuritis, one occurred four days, three in the third week, and one in the fourth week after cessation of uleron treatment.—We are, etc.,

London, W.1, September 2. A. J. COKKINIS. G. L. M. MCELLIGOTT.

Complications of Chemotherapy

SIR,—The annotation on chemotherapy in gonorrhoea in the *Journal* of August 6 (p. 294) stressing the inherent

risks in the uncontrolled use of modern drugs of the sulphanilamide type is most timely. To all those who have studied recent articles on their clinical application it will be apparent that the incidence of generally recognized complications is invariably higher in ambulatory patients. This suggests that it might be desirable—although under actual working conditions it is probably impossible—to restrict the use of these drugs to patients confined to bed. As a first step it might be more practical to suggest clinical research into the best methods of preventing or neutralizing these toxic effects. A further point which has been apparent to me during recent work on chemotherapy concerns the cerebral depression which, in a few days or weeks, not infrequently follows the therapeutic use of sulphanilamide in patients normally possessing, and requiring, a high degree of mental acuity. That this phenomenon is just the after-effect of a severe illness is hardly likely since cases have occurred after relatively mild conditions, such as streptococcal sore throat, for which sulphanilamide has been used, and the depression is most pronounced following ambulatory treatment. So far I have not seen any published account of this rather disquieting complication, but I hope in time to collect adequate statistical evidence to demonstrate the point more conclusively than is possible in a letter.—I am, etc.,

Norwich, August 27. W. R. THROWER, M.D., M.R.C.P.

Orthopaedics in Rheumatoid Arthritis

SIR,—In Mr. Norman Capener's paper under this title in the *Journal* of August 20 (p. 391) reference is made to the correction of flexion deformity of the knee.

Mechanical or splinting methods can be best applied to contractures of only mild severity. In cases of severe degree the chief risk is of pressure sores. Manipulation, if used at all, is best used as a tentative adventure in skilled hands and only in the mild cases. That manipulation is not without danger is attested by instances of fracture. I have known of a fatality, presumably from fat embolism, occurring after a gentle attempt to extend a flexed rheumatoid knee. Recurrence of the contracture is always to be feared if complete extension is not achieved. In my own experience I have found the operation of posterior capsuloplasty, as described by P. D. Wilson (*J. Bone Jt. Surg.*, 1929, **11**, 40), of great service in certain selected cases of resistant and severe flexion contracture. It should be done only after the disease process has become quiescent and when the general physical condition is good. Supracondylar osteotomy of the femur is also a recognized method for the correction of fixed contracture of the knee. It allows the condyles of the femur to be rotated forward, thus bringing the knee into complete extension. It does not increase the rate of movement, but places it at the point of greatest functional value. The method of Osgood (*Amer. J. orthop. Surg.*, 1913, **11**, 336) is to be recommended. If there is much atrophy of bone osteotomy is inadvisable.

Arthroplasty-excision of the elbow can be a very satisfactory operation. A Kocher incision is made. The lateral ligaments are preserved as far as possible. An ample amount of intervening bone is removed. To preserve lateral stability the lower end of the humerus is cut in the form of an inverted U or V, leaving the lateral epicondyles and enough bone beneath to give them strength. Horsley's wax may be rubbed into the raw surfaces, or a double layer of fascia lata employed. In the after-care there is no need to hurry in obtaining motion. My practice is to keep the joint quiet for seven to ten weeks in a posterior moulded plaster splint. This gives time for all reaction to settle down. The movements quickly return, it may be by the initial assistance obtainable from putting the joint very gently through its movements under an anaesthetic. The disease process should be quiescent before the operation is attempted.

Rheumatoid arthritis generally occurs in the slender congenital visceroptotic type of individual. One must suppose that this type, for a number of reasons, is less able to withstand the many stresses of life than the normal or the sthenic type of individual. Whether it be cause or effect, one notices that almost invariably such cases have very poor posture and tone. In treatment I regard it as important that the "deranged mechanics of the physiology" should be corrected. During their institutional care, in suitable centres, a gradual process of reconstructive rest should be instituted, aiming, above all, at restoring a spreading out of the subcostal angle and proper diaphragmatic action.

Thrice daily for an hour a pillow is placed beneath the thoracic spine and the patient lies thus, with the hands clasped behind the head. The mattress should be firm. Instruction is given in the correct methods of breathing, and also in simple lying-down exercises, so that the patient may obtain a sense of active voluntary control of the muscles of the lower back, abdomen, and trunk. Gradually the whole appearance of the body improves, and the patient begins to lay on fat in the upper abdomen with improvement of visceral and muscular tone. A posterior moulded plaster shell is made for the trunk, to support the loins and to maintain the improved statics. When the patient gets up she is instructed in the control exercises necessary to preserve an habitually improved posture, being assisted at first by a light posterior spinal brace and corset.

The orthopaedist should do much more than prevent or correct the deformities of joints in rheumatoid arthritis. His knowledge of the correlation of the structure and function of the body is needed to-day in framing a national policy of physical education, so that susceptible subjects, and indeed everybody, may have their lives wisely guided in this and in other respects; in particular, as to how to use their bodies, not in a constant state of physiological deformation, but at the highest potential of right use. It is the orthopaedist who should understand and encourage the technical measures required in the physical reconstruction of the chronic patient, by restoring the faulty posture and poor tone so frequently existing. This is a complete art in itself, consisting of measures of reconstructive rest, re-education, and support until right use has been re-established. It is not to be left to the physiotherapist. The chronic patient remains a perpetual challenge and reproach to us, and I would submit that he will remain so until there is an appreciation of the value of employing the medical orthopaedist combined with the physician in the treatment of these cases. These matters are well understood in certain parts of America, as in Dr. Loring Swaim's clinic at the Robert Bent Brigham Hospital, Boston. One rarely hears the matter discussed in our country, and yet the results under such conditions can be most satisfactory. Our own orthopaedic surgeons should give a lead in regard to physical education and the broad reconstructive measures required in the chronic medical class of case. Is this not preventive and curative orthopaedics in the best sense?—I am, etc.,

Edinburgh, August 26. W. A. COCHRANE.

Rheumatoid Arthritis and Jaundice

SIR,—The following case may intrigue those who are interested in the treatment of rheumatoid arthritis with vaccines.

A male patient of mine has suffered from rheumatoid arthritis of gradually increasing severity for some forty years (he is now 62), and has been under every possible treatment—including spa therapy, physiotherapy, various vaccines, etc., not to mention a host of infallible advertised remedies—except gold. In February of this year Dr. W. M. Crofton saw him with me, and had an autogenous polyvalent vaccine made for him. The patient was extremely

sensitive to his vaccine, and I had great difficulty in getting him going, but by Tuesday, April 5, I had reached a dose of 4 millions. The result of this dose I had better give in the patient's own words:

"Nothing happened on Wednesday, but I woke up on Thursday with a severe headache and aching pains all over, and with great lassitude—as if I were in for an attack of influenza. By evening the muscles of my chest felt contracted and I had a feeling of suffocation, as if I were tightly bound with ropes or in a vice, and I could only speak in shortish gasps.

Friday.—No change and no alleviation.

Saturday.—Very little better.

Sunday.—Felt pretty well done in and horribly sick, but did not vomit. I could not eat but wanted to keep drinking. I noticed my skin looking yellow.

Monday.—I was a deep yellow colour all over, including my eyes. The feeling of constriction gradually went off, but for several days I felt too ill to eat and did not feel my usual self for a good fortnight. The jaundice disappeared entirely.

I had another injection on May 3, and in another two days had a repetition of the reaction I have described and another attack of jaundice, but in a milder degree and with more rapid recovery. Since these two attacks of jaundice I have been very agreeably surprised at the very steady and definite progress I have made towards recovery; there has been a decrease in pain and an increase in flexibility. I am quite satisfied that I was improving under this treatment before the attacks of jaundice, but not to anything like the same extent as I have since."

I have continued with his vaccine very slowly and carefully, and have reached a dosage of 7 millions without any reactions beyond slight focal effects. He is still making steady and practically uninterrupted progress, which after forty years is, to say the least of it, encouraging.—I am, etc.,

Chippenham, August 29. GEO. LAURENCE.

SIR,—We have read with great interest the article by Dr. Philip S. Hench on the effect of spontaneous jaundice on rheumatoid arthritis in the *Journal* of August 20 (p. 394). Dr. Hench discusses various ways in which experimental jaundice may be produced, but he does not mention the toxic jaundice which is often seen in gold treatment. In our experience of nearly 1,500 cases treated with gold salts jaundice has occurred in 119. We are not here concerned with the mechanism of the jaundice. If, however, the claims of Dr. Hench are valid our own series should provide evidence in their favour, and one would expect that those patients who develop jaundice would show greater improvement than those who do not. Our experience has been the reverse, and is summarized in the following paragraphs quoted from our papers in the *Lancet* of October 2, 1937 (p. 784), and October 9, 1937 (p. 838):

"There is, however, a significant difference in the results in cases that have had toxic jaundice as compared with cases having had no jaundice. . . . The differences are statistically significant; the most important part of the discrepancy is shown to be in the 'no improvement or worse' class. In this connexion it is of interest that five cases developing jaundice after one to four gold injections showed no clinical improvement. These cases are not included in the above table as they had not completed one full course. Our figures show, therefore, that the results of cases having toxic jaundice are worse than in those having no jaundice, and our experience does not support the claims of Hench (1935) that jaundice is a valuable therapeutic measure in rheumatoid arthritis."

These figures were concerned with seventy-four cases of jaundice arising in 671 cases of rheumatoid arthritis treated with gold salts. In all cases the jaundice was of considerable severity and varied in duration from three to twelve weeks. In view of the size of this series of cases it is rather unfortunate that no reference was made to it in either Dr. Hench's paper or your annotation.—We are, etc.,

STANLEY J. HARTFALL.
HUGH G. GARLAND.
WM. GOLDIE.

Leeds, August 27.

Treatment of Malaria

SIR,—Your annotation in the *Journal* of July 30 (p. 227), on the treatment of malaria, comments that "in primary infections a mean daily dose of 15 grains of quinine may bring about the disappearance of trophozoites of benign tertian or quartan malaria on an average on the third day, although relapses occur in a percentage of individuals which may be as high as 50."

There is no doubt that many relapses are due entirely to the fact that 5 or 10 grains of quinine are prescribed thrice daily after meals, no regard being paid to the time of onset of the rigor and to its duration. It has been shown, however, that during the rigor the trophozoites are to a large extent free in the blood and unprotected by the capsules of the erythrocytes. For a period of three to ten hours the parasites are vulnerable to quinine therapy, and are destroyed readily if the dosage is adequate. After they have entered the red blood cells—that is, during the period between rigors—they are very little affected by small doses of quinine—to wit, 5 to 10 grains daily.

A method of administering quinine that is very effective is to give 15 grains orally three hours before the onset of the chill, followed by two further doses of 15 grains at intervals of two hours after the first. In consequence the quinine content of the blood rises just before the trophozoites disrupt from the red blood cells and is maintained at a high level for eight to ten hours. No quinine is given on the days between rigors, since small daily doses retard the development of schizonts and may convert a primary infection to a chronic relapsing form. Continuous quinine therapy may also encourage the parasites to inhabit the spleen, while very little splenic enlargement is found with the above "shock" method. No mention was made in the annotation of the use of neosalvarsan in chronic forms of benign tertian and quartan malaria, so it appears that no reference was made to it in the League of Nations' Bulletins. This is somewhat surprising.—I am, etc.,

Port Royal, Jamaica, August 15. KENNETH ROYES.

Tuberculosis Dispensaries or Chest Clinics?

SIR,—In the report in your issue of August 6 (p. 312) on the Section of Tuberculosis at the Annual Meeting of the British Medical Association I noted with interest that Dr. G. S. Todd deprecated the use of the term "T.B. dispensary," and suggested that to call such a dispensary a "chest clinic" would encourage more people to attend. I have for some years urged that the present title is most unfortunate, militating against the fullest use of these institutions, and should be replaced by "chest clinic."

In a paper read to the Tuberculosis Association at Cambridge some years ago I dealt in detail with this subject, and then stated that the prevention of tuberculosis depended upon four factors: (1) The so-called "tuberculosis dispensary," controlled by the local authorities' public health organization and fully equipped for clinical, pathological, and radiological investigation. (2) The part played by the general practitioner. (3) The education of the layman in the principles of hygiene. (4) The education of the medical student, and therefore

the general practitioner, in tuberculosis in particular and diseases of the chest in general.

The tuberculosis dispensary can and should be of the greatest service, but I am convinced that in the interests of patients, practitioners, and the public health service alike there is great need for its reorganization and readjustment. Experience shows that at most properly equipped dispensaries at least 50 per cent. of new cases sent for diagnosis at each session, after routine clinical and radiological examination of the chest and bacteriological examination of the sputum, prove to be either free from disease or suffering from some other form of pulmonary or extrapulmonary mischief. The large variety of non-tuberculous pulmonary and extrapulmonary diseases seen at these centres, and the fear which the word "tuberculosis" still excites in the minds of many laymen, lead one to ask, Is the title "tuberculosis dispensary" as a centre for early diagnosis and prevention an ideal one to induce practitioners and patients alike to make the fullest use of it? Many general practitioners have told me that the average new patient dreads nothing more than the idea that he must attend a "tuberculosis dispensary," and the injunction to go to it may be strongly resented. Some patients after tactful explanation will reconcile themselves to the idea; others, possibly less intelligent, fear the worst; they suspect that the doctor considers them "social lepers" (as one patient put it to me), and from the moment of entering the dispensary, should they consent to go there, they are commonly a mass of nerves, enduring anxious nights until the diagnosis is made for good or for bad. How can such an atmosphere favour preventive work or encourage complete co-operation by the general practitioner—the pillar of any successful tuberculosis scheme? If the centre were renamed "municipal chest clinic," as in the county borough of East Ham, these difficulties would not arise. The clinics, if linked up with medical schools, could serve also as valuable teaching centres both for students and for practitioners.—I am, etc.,

London, W.1, August 22. PHILIP ELLMAN.

Prevention of Blindness

SIR,—At a recent meeting of representatives of local authorities in the North of England, whose special interest is the administration of the Blind Persons Act, 1938, and Section 176 of the Public Health Act, 1936, I drew attention to two factors in the administration of these Acts which call for special consideration: (1) local authorities in England and Wales are spending over £2,000,000 a year on the welfare of the blind; (2) they are relying almost entirely on the devotion of such leisure time as may be found possible by ophthalmic surgeons, already engaged in teaching and in private ophthalmological practice, for the reduction of this expenditure. The present policy, which apparently views with equanimity the payment of this heavy annual charge in perpetuity, is a bad one. Also a policy which accepts responsibility for this annual charge and relies for its liquidation upon such meagre voluntary efforts as are possible by ophthalmic surgeons, whose time is almost fully occupied in the prevention and cure of blindness by such orthodox methods as are known to us to-day, is a bad one.

My recommendations to the local authorities' representatives were: (1) That the present public health administration should be utilized to its fullest extent, especially in regard to statistics, infectious diseases which lead to blindness, congenital blindness, etc. (2) That an effective organization for clinical and laboratory research be initiated.

With regard to (1) little need be said, as its possibilities are well known. Recommendation (2), being comparatively new so far as local authority administration is concerned, needs elaboration. Local authorities should be asked to contribute not more than 1 per cent. of their annual expenditure on blind welfare to a central research fund for the prosecution of research (clinical and laboratory) into such conditions as lead to blindness. Such a scheme has been started in a small way by voluntary effort in Edinburgh. In my opinion, Sir, this effort, while admirable so far as it goes, is totally inadequate, having in view the importance of the problem and the annual cost of blind welfare to the taxpayer.

It is suggested that similar research centres, adequately financed by local authorities collectively, should be established, say, one in the North of England, one in the Midlands, and two in London. The establishment of such centres would imply the closest co-operation with existing ophthalmological teaching arrangements. Each centre should have on its staff two whole-time research ophthalmic surgeons, appointed for, say, five years at a salary which would attract highly qualified men, who would be specially selected for their suitability for research work. The centres and funds available should be controlled by a central research board, on which, it is hoped, there would be representation of the British Council of Ophthalmologists, the Joint Committee on Blind Welfare of the Association of County Councils and Municipal Corporations, the National Institute for the Blind, and the Ministry of Health (Prevention of Blindness Committee).—I am, etc.,

Leeds, August 23. C. G. KAY SHARP, M.D.

Undescended Testicle

SIR,—It is surely bad logic to argue, as Mr. Denis Browne does in his letter in the *Journal* of August 27 (p. 473), that because gonadotropic extracts may induce descent of a testis, which subsequently remains in its new —and natural—position, some undesirable result of a mysterious gonadotropic influence, which has for many years lain dormant, may manifest itself in the remote future. The action of the gonadotropic hormone is "transient" in so far as if the injections are not repeated two or three times weekly for some months the desired effect—namely, descent of the testis into the scrotum—will not be obtained. The fact that this result is, we hope, "permanent" provides no justification for supposing that the agent which induced it continues to exert an influence, which may become obvious many years later. The trailers of the red herring to which I referred in my letter in the *Journal* of August 13 (p. 374) manage to suggest that some sinister disaster may in the remote future overtake the unfortunate patient who in his youth has received gonadotropic therapy. This "gipsy's warning" intrigues me, and I wish that one of these sceptics would tell me just exactly what it is that may happen to the wretched patient.

Mr. Browne believes that doubts as to "the complete harmlessness of pregnyl" are "fairly widely held." (Incidentally, it would be better to refer to this substance as gonadotropic hormone, since "pregnyl" is merely a trade name for a preparation of this material distributed by a certain commercial firm.) I would be grateful if he would introduce me to his authorities, as most of the endocrinologists I know would agree with me, I think, in saying that such preparations used in therapeutic doses and over a reasonable period of time give rise to no adverse effects. Here let me repeat what I pointed out in my previous letter—that in my experience descent of the testis occurs in 50 per cent. of the successful cases within three months

of starting endocrine treatment. In such circumstances I have encountered no adverse effects, and I consider that Mr. Browne has been unfortunate in observing genital hypertrophy "often" after such treatment.

Apparently Mr. Browne *is* afraid of using insulin and thyroid extract. Surely he underrates his own clinical common sense, for he admits that it is only the "rash use" of these substances which may be attended by harmful effects. It does not need an endocrinologist, nor Mr. Browne, to realize that the rash use of morphine or chloroform may lead to fatal results, and yet both he and I have used them with perfect equanimity for hypnotic and anaesthetic purposes. His conception of the growth hormone—or, to read him correctly, as he continually asks his critics to do, "growth hormones" (I did not know that more than one had yet been demonstrated)—is rather like Lewis Carroll's conception of the effects of Alice's cake labelled "Eat Me." I only wish it were possible to increase skeletal growth appreciably even in dwarfs—that is, persons suffering from growth-hormone deficiency—let alone in "a developing child," who is presumably being supplied with a sufficiency of this hormone and from whose body any excess given in the form of injections would therefore be rejected unutilized.

Mr. Denis Browne regretted that someone who knows more about hormones than he does had not answered my letter to disagree with my conception of the effect of gonadotropic preparations. It apparently has not occurred to him that someone who knows more about hormones than he does might possibly agree with me and not with him.—I am, etc.,

London, S.E.1, August 29. P. M. F. BISHOP.

A Strict Vegetarian Diet

SIR,—In answer to "W. H. S." (*Journal*, August 27, p. 480), the parents live on a vegetarian diet—for example, turnips for the evening meal—but the father eats bread-and-butter and drinks tea and wine. He does some work in the City, but lives very largely a sylvan life. A daughter goes to a boarding school and eats there an ordinary diet, but starts the holidays with a fast and then goes on to the strict vegetarian diet. The school complains that she loses some pounds in weight each holiday. The family are all thin, but the father says all wild animals have no fat on them. The boy lives a sylvan life, walking to school in a neighbouring small town. I think the open air makes the meagre diet possible, and that he must get more calories in his diet than are reported to me, but I have not been able to find out how.

The Press, referring to my article, wrote about the "perfect boy," but all I wished to show was that he was holding his own on an astonishingly limited diet. I tell his father that I think the boy's growth will be stunted. The Press showed an extraordinary desire to secure the boy's address, which I refused to divulge. Reporters visited me in Norfolk, my chauffeur's home, my son who was staying in Suffolk, my daughter in London, and the secretary of the St. John Clinic. Finally, one reporter by some means—such as asking the postman where a man lived in a bungalow in a wood in the district round my home—secured photographs of the mother and children. Fortunately, his paper followed this up by illustrations of jolly children living on an ordinary diet in a London crèche.—I am, etc.,

St. John Clinic, London, S.W.1, August 28. LEONARD HILL.

SIR,—Sir Leonard Hill's figure (*Journal*, August 20, p. 417) of 28 grammes a day for the protein intake of a vegetarian boy aged 9 years is about half the average daily protein intake amongst vegetarians as a whole. The figure which I obtained some years ago in a week's experiment on 118 vegetarians given a varied diet with a wide choice of foods was 81 grammes per "man" per diem. This is equivalent to an intake of 57 grammes a day for a boy aged 9, using a scale of man values supplied by Professor Cathcart, who kindly read through and criticized the summarized results. On the other hand, the deviation in protein intake among different vegetarians is such that some probably do not consume much more in proportion to their size than Sir Leonard Hill's subject.

Turning to the source of protein in vegetarian diets, in my experiment the average daily intake per "man" was distributed as follows: dairy protein 33 grammes, cereal protein 27 grammes, nut protein 8 grammes, vegetable and fruit protein 13 grammes. The intake of dairy protein was considerably higher than that of Sir Leonard Hill's subject. The vitamin C intake, although not accurately determined, was certainly several times the normal intake, since the diet contained large amounts of fresh fruit (especially oranges and apples) and salads (especially lettuce and tomatoes).

In view of Sir Leonard Hill's remarks on the excellent physique attained by his subject on a low protein diet, it may be of interest to refer to experiments carried out by Wishart in Professor Cathcart's laboratory on a vegetarian cyclist who was tested on diets of widely varying protein content (*J. Physiol.*, 1934, **82**, 189). Wishart's results showed that the athletic performance of his vegetarian subject did not seriously diminish until the protein intake fell below 40 grammes a day. In a boy of 9 years this would be equivalent to 28 grammes a day. Thus it would appear that the protein intake of Sir Leonard Hill's subject was the minimal for satisfactory physical development, and a somewhat higher protein intake would probably be preferable for the average subject.—I am, etc.,

London, W.C.1, August 29. FRANK WOKES, Ph.C., B.Sc.

Steinach II Operation for Prostatic Enlargement

SIR,—Mr. Kenneth Walker's assumption (August 20, p. 423) that, although clinically my two patients were much improved, the prostate remains enlarged seems to be correct. Now, fifteen and ten months after operation respectively, both prostates feel larger than normal on examination per rectum. In the first patient (with residual urine $1\frac{3}{4}$ oz.) the gland feels very big; in the other the enlargement seems slight. I have no written record of how they felt before operation, but my impression is that to the examining finger there is little appreciable change. If I have another case this is a detail to which I shall pay special attention.—I am, etc.,

Ludlow, August 25. T. HUNTER, C.I.E., M.D., Lieutenant-Colonel I.M.S. (ret.).

Prolonged Occipito-posterior Presentation

SIR,—There has in recent years been a good deal of discussion in the *Journal* regarding the management of cases of occipito-posterior presentations. Most authorities advise rotating the head and shoulders forwards; one practitioner stated that his practice was to put on the forceps, push the head back a little, and then rotate it with the forceps. One of the Dublin books considers the delay is chiefly due to weak pains, and advises a sleeping draught so that the patient gets a few hours' rest, and when she wakens up refreshed she is able by strong pains to expel the child.

Galabin in his book strongly recommends the vectis to be applied over the occiput and to pull it down, thus

flexing the head and making delivery easy. The vectis is a sort of artificial hand. I have on one occasion in my early days, in a very troublesome case, put the woman on her elbows and knees across the bed, and slipped my fingers up the rectum and pulled down the occiput, with delivery following soon thereafter. It appears that women who adopt the squatting position in labour are not much troubled with occipito-posterior presentations. Theoretically, if the head can be well flexed there should be no more difficulty in delivering it, whether it be occipito-posterior or occipito-anterior; just as an egg when placed upright will slip easily into an egg-cup, but not if placed transversely. The forceps are very apt to slip off the head when the occiput is to the back, as the blades point forward. The os does not dilate readily in cases of occipito-posterior presentations, and the "waters" are apt to break too soon.

The following case may help young practitioners.

A multipara took ill at 2 p.m., and at 12 midnight sent for the nurse. The nurse sent for me at 6 a.m. with a note saying the patient was exhausted, the os rigid and only partially dilated. The patient had been suffering severely for sixteen hours. I found the os partially dilated, the lips thickened and rigid. The smooth back of the child could not be felt, but an irregular outline, and evidently the hands, were felt through the wall of the abdomen. The lozenge-shaped fontanelle was easily felt, forwards. I at once gave the patient a hypodermic injection of morphine, gr. ¼. In half an hour the os had thinned out and had dilated a good deal. I then directed the nurse to administer chloroform in small doses to ease the pains and dilate the os. This was successfully accomplished in the next half-hour. I then applied the forceps, burying them deeply to prevent them slipping off the head, and pulled, at first rather backwards. I had no difficulty in bringing the head down to the perineum, when I removed the forceps, and with the fingers of my left hand pushed, at short intervals, the head forwards, so as to favour its flexion round the pubis. The shoulders were then turned round into the antero-posterior diameter and cautiously extracted. These measures saved the perineum, so that no stitching was required.

This case teaches the great advantage of using morphine and chloroform in such prolonged labours. The woman was delivered within one and a half hours after my arrival.

In all cases when chloroform is administered in labour there is a great tendency for the uterus not to contract properly, but to be relaxed, allowing blood clots to accumulate in it and giving rise to more haemorrhage than is natural. To prevent this a hypodermic injection of pituitrin should be given at once after the extraction of the placenta.—I am, etc.,

Dornoch, August 25 JOHN T. MACLACHLAN, M.D.

*** An article on occipito-posterior presentation by Professor Chassar Moir appears at page 555 of this issue and a leading article at page 577.

"Psychosomatic Illness"

SIR,—In the *Journal* of August 27 (p. 475) Dr. P. Lionel Goitein states that he examined over one hundred unemployed men (presumably not on the sick-list), and found that "less than a quarter showed actual neurotic illness." In a previous inquiry, to which Dr. Goitein evidently refers, I examined 1,000 insured persons who had been on the sick-list mostly for a period of months, and I noted that the incapacity in a third of these could best be attributed to psychoneurotic illness. Because of the difference in these rates of incidence (his being one-quarter, while mine was one-third) Dr. Goitein immediately concludes—or, as he phrases it, he has "reason to believe"—that my allocation of patients was of doubtful psychological validity. However, he omits to point out that the two samples examined (his patients being able-bodied, while mine were unfit) are not comparable, and that it also would be "reasonable to believe" that the incidence of "neurosis proper" in persons who are able-bodied would probably be appreciably lower than that in persons in receipt of certificates of incapacity for work. This is not to say that I may not have made mistakes, but I am not aware that I did err, at least in the rather obvious directions hinted at by Dr. Goitein. Further, the demonstration of the rising incidence of psychosomatic illness given in my paper of July 2 (p. 11) is in no way invalidated even if, for the sake of argument, my previous contributions are omitted from consideration; its findings are supported by the evidence of many other independent workers, the soundness of whose methods has not so far been challenged by Dr. Goitein.

The concept formulated by the term "psychosomatic illness" promises to be one of considerable practical importance to general and preventive medicine. For this reason all pertinent criticism must be welcomed and met. I have therefore tried to meet fairly what is objective and relevant in Dr. Goitein's letter, and have confined my comments solely to this one aspect of his psychographic behaviour.—I am, etc.,

Glasgow, August 29 JAMES L. HALLIDAY.

Medical Evidence at Inquests

SIR,—Dr. J. L. Barford's experience (*Journal*, August 27, p. 475) is not quite so exceptional as he imagines. A short time ago I was called urgently to the home of an insured patient, upon whom for many weeks previously I had been in constant attendance, on account of severe mental depression following an operation for gastric ulcer. I arrived to find him lying dead on the kitchen floor; he had hanged himself by means of a cord thrown over the door. The cord had been cut by his son, and the body released and laid on the ground, only a few minutes before my arrival. I attended the post-mortem examination, and gave material information regarding the case to the medical man from a distance who had been asked to make the examination, and who gave evidence at the inquest. I, who had known and treated the patient in life and who saw him immediately after death, was not called. An incidental result of the absence of medical evidence regarding his final illness was a paragraph in a local paper headed "Suicide's Imaginary Illness," which distressed his relations.—I am, etc.,

Purley, Surrey, August 28. A. LANKESTER.

SIR,—I am also very ignorant of the habits of coroners, but I have reason to feel that the treatment Dr. J. L. Barford has received is not unusual.

In my instance I was summoned to a case of death from gunshot wounds. The incident occurred on a very wet night in mid-winter, and my examination of the body had to be conducted in a dark and dirty shed by the light of a small electric torch. After making a thorough examination I was asked to make a statement to the police officer in charge of the case. This I did; and expressed my willingness to help further if this was needed. The following day the police officer called again, and I gathered that he was acting as coroner's officer. He requested me to make a further statement as to the probability of the wounds being self-inflicted for the information of the coroner. I gave him the information required. A day later I was informed by the police that I should not be required to attend the inquest

Some time later I wrote to the coroner and also to the superintendent of police for the district with a request for a fee for the assistance and opinion I had given. The coroner replied to the effect that he could not allow a fee as I had not been called to give evidence, while the police replied to my request by a telephone conversation, when they made it quite clear that they could accept no responsibility.

I was later informed that no medical evidence was given at the proceedings before the coroner, but only that of the police officer who was present at the time of my examination of the body.

This incident appears to me to be a little more than unusual and raises the question as to whether a medical man who is not a police surgeon should give his services in such cases, and, if he does, is he expected to do so without recompense or even thanks? It also raises a further point as to the actual value of medical evidence at inquests, since in this case the evidence of the police constable was considered to be sufficient.—I am, etc.,

Monk Sherborne, August 27. J. J. DAVIS.

Vitamin C in Milk

SIR,—Apropos your important annotation on this topic in the *Journal* of August 27 (p. 458), as an alternative to freeing milk from dissolved oxygen, as suggested by the American workers, would it be easier to distribute the milk in coloured bottles? Could some authority suggest a suitable colour for the glass?—I am, etc.,

Llandilo, August 27. J. H. LLOYD.

Sequelae of War Gas Poisoning

SIR,—With reference to the correspondence in the *Journal* concerning sequelae of war gas poisoning, Mr. H. Ramsbotham (quoted in the *Journal* of July 2, p. 39) is correct in that the mortality statistics for ex-service men quoted by me as regards Great Britain, the United States, and South Africa are his own figures, and do not refer exclusively to cases of chemical injury. My statement that the mortality rate for respiratory diseases in ex-service men in New Zealand is 30 per cent. above normal is based on an official communication from the Pensions Department of New Zealand. This states that "the proportion of ex-soldiers who have died from various diseases of the respiratory tract is very high, although the proportion in receipt of a pension as at March 31, 1931, was only 15 per cent., yet the total deaths from chest diseases in the last ten years up to March 31, 1931, represents a percentage of 42.4 over that period." The mortality for respiratory disease for New Zealand as a whole during that period is given as 32 per cent.

As regards Sir Henry Morris-Jones's statement concerning the high incidence of chronic respiratory disease following exposure to war gases, he may be interested to know that a statistical investigation of ex-service men who appeared before the War Pensions Appeal Board of New Zealand at Auckland in 1937–8 has been undertaken. Owing to the fact that gas was not used at Anzac or in Palestine it is possible to compare this group, as regards the incidence of chronic lung degeneration and disease, with men who saw service in the gas areas in France. Of 240 men in the gas-exposed group 135 showed clinical and radiological evidence of cardiac rotation associated with pulmonary degenerative changes, as compared with only ten men in a group of seventy who could not have been so exposed—56 per cent. as compared with 14 per cent. (Pulmonary tuberculosis and occupational factors were excluded.)

While such an increase is very striking (400 per cent.) it is fortunately no indication of the incidence of chronic lung diseases in ex-service men as a whole, since many of the men had appealed solely on the ground of chest disabilities. There is good reason to believe that sequelae following chemical injury only occur in cases of lesser exposure when certain constitutional factors are present.

A full account of the statistical investigation referred to could be obtained from the Medical Research Council of Great Britain.—I am, etc.,

W. N. ABBOTT,
August 5. War Pensions Appeal Board, Auckland.

London Emergency Bed Service

SIR,—In connexion with the London Emergency Bed Service there is one point I would like to make known. When the service was first opened the telephone number was not put in the directory for fear of its being used for bogus calls. In consequence a number of doctors who have read the appreciative letters in the issues of the *Journal* of August 20 and 27 have been unable to obtain the number, which is Metropolitan 8781. The number will appear in future issues of the directory. The Service has now been going for just over two months, and I hope that by the end of this week we shall have received our one-thousandth call.—I am, etc.,

R. E. PEERS,
Secretary, Voluntary Hospitals
London, E.C.2, August 29. Emergency Bed Service.

The Science Museum has recently acquired on loan from Professor E. O. Lawrence of California an example of the cyclotron, an apparatus invented by Professor Lawrence and his associates which accelerates individual atoms to very high speeds without the use of very high voltages. It is used for bombarding the nuclei of other atoms with high-speed atomic projectiles; from the study of the disintegrations and transmutations which take place under these conditions a great deal is being discovered about the structure of atomic nuclei. (An annotation on the cyclotron appeared in the *Journal* of July 2, p. 25.) The late Lord Rutherford was the first to show in 1919 that the nuclei of atoms could be broken up by bombarding them with the alpha-particles emitted from radium and its products. In 1932 Cockcroft and Walton in Cambridge succeeded in breaking up atomic nuclei without the aid of radio-active materials by bombarding them with hydrogen nuclei or "protons" accelerated to a high speed in a vacuum tube to which about 500,000 volts was applied: their original apparatus may be seen in the Science Museum. Lawrence's cyclotron is able to achieve similar results without the use of these very high voltages, which lead to great practical inconveniences. The instrument which he has lent to the Science Museum was constructed in 1931, and with an applied voltage no greater than 4,000 volts it was capable of accelerating protons to a speed which would require 1,200,000 volts directly applied. With its aid Lawrence and his co-workers were able to confirm and extend Cockcroft and Walton's results. Professor Lawrence has also presented to the museum a series of photographs showing the development of the cyclotron. The 1931 model has now been superseded by a larger instrument which can accelerate atomic particles to a speed which would require 16 million volts directly applied, and with this instrument results of great importance are being obtained in California. Cyclotrons are also being put into operation in Great Britain, and their performance will be watched with the keenest interest.

Obituary

SIR DAVID WILKIE, M.D., M.Ch.,

F.R.C.S.Ed. and Eng.
Professor of Surgery, University of Edinburgh

The news of the sudden death on August 28 of Sir David Wilkie at the age of 56 must have come as a shock to the medical profession, and especially to the many who heard him speak at the Annual Meeting of the British Medical Association at Plymouth in July of this year. The profession has sustained the loss of a great surgeon, one whose work was ever characterized not only by skill and courage but also by great kindness of heart. Thereby he endeared himself to all who came under his influence, and probably no surgeon in recent years has had more members of the medical profession and their relatives under his professional care.

David Percival Dalbreck Wilkie was born in Kirriemuir, in Angus, the "Thrums" of J. M. Barrie, Wilkie's intimate personal friend. From his home in the north-east of Scotland he proceeded to the Edinburgh Academy, a school of which he often spoke and for which he had a fond affection. From the school he went to the University, where he graduated M.B., Ch.B. in 1904; he took his M.D. in 1907 and the Ch.M. in 1909, receiving a Gold Medal for his thesis. He became a Fellow of the Royal College of Surgeons of Edinburgh in 1907 and of the Royal College of Surgeons of England in 1918. He was made an Honorary Fellow of the American College of Surgeons in 1926. After qualifying he held the posts of house-physician and of house-surgeon in the Royal Infirmary, Edinburgh, and was also house-surgeon at Chalmers' Hospital and the Royal Hospital for Sick Children, Edinburgh. He was a member of many important scientific committees and boards—having served, for example, on the Medical Research Council and the Scientific Advisory Committee of the British Empire Cancer Campaign—and was an active and much-valued member of the British Medical Association. He was Vice-President of the Section of Surgery at the Annual Meeting at Cambridge in 1920 and of the Section of Proctology at the Newcastle Meeting in 1921; he was President of the Section of Surgery at the Edinburgh Meeting in 1927 and was a Vice-President of this Section at the Centenary Meeting in 1932. He received a knighthood in 1936. To the British Dominions, the U.S.A., and to various European countries he went as an invited orator, and from them he received many honorary distinctions.

Early in his postgraduate career Wilkie began to reveal those characteristics which rapidly brought him to the forefront of his profession. He was a natural surgeon, endowed with qualities of thoughtful and careful judgment, brilliant manual dexterity, courageous decision, and fearless execution. These were the gifts with which he approached his life's work, and fortunately his early training went far to foster their successful fruition: he was house-surgeon to Francis Mitchell Caird, later Regius Professor of Clinical Surgery in Edinburgh University. All who knew that great master of surgery and Lister's most devoted disciple will have some understanding of the lessons Wilkie learned from him. Herein, probably unconsciously, were planted the seeds of the love of research. When Wilkie worked as house-surgeon to Sir Harold Stiles in the Children's Hospital and in Chalmers' Hospital he came under the influence of a very great surgeon of the modern school, one trained in anatomy and imbued with the spirit of Kocher and William Mayo. His resident days in hospital over, and a period of study in Germany and Austria completed, Wilkie, keen to get out into the world and work among men, paid a hurried visit to Canada, scouring the land as a possible field in which he might practise his profession in the future. Fortunately for his native land he returned again to Edinburgh, rapidly advanced from post to post, and instituted those researches in experimental surgery with which his name was associated throughout the surgical world. For his researches in abdominal surgery he was awarded the Liston Victoria Jubilee Prize in 1918.

Before the outbreak of war Wilkie and his two academical friends, Lorimer and Hugh Reid, joined the Royal Naval Volunteer Reserve. They were mobilized when war broke out. It was Wilkie's fate to be detailed to the Naval Barracks at Portsmouth, and here one found him happy and contented with the minor post he occupied; with leisure on his hands he studied for his primary English

Fellowship. From Portsmouth he was appointed medical officer in charge of the hospital ship *Saint Margaret of Scotland,* which proceeded to the Mediterranean and ultimately was located in Salonika. On his return from there he was detailed for service in France as a surgeon with a casualty clearing station. The war over and civil work again restored to its customary routine, Wilkie returned to his work in Edinburgh as an assistant surgeon to the Royal Infirmary and to Leith Hospital, and to research work in the Royal College of Physicians Laboratory. Already he was a man marked out from his fellows, and even before the war, when the Provincial Surgeons, a surgical club created by Moynihan and having within its ranks many of the foremost surgeons of the day, looked for one to join their select number, their choice lighted on "a youngster from Edinburgh": they selected Wilkie.

After a short period of teaching surgery in conjunction with Sir John Fraser in the Extra-Mural School, he was appointed to the Chair of Surgery in Edinburgh University as Professor Alexis Thomson's successor. The terms of this appointment were so modified as to put upon Wilkie a burden greater than almost any man could bear, but he welcomed the post cheerfully, as it gave him the opportunity of developing a school of surgical research which has since formed the model on which others have been framed. He charmed his students with his eloquent tongue as a lecturer, directed his surgical research department, discharged his duties as a surgeon-in-ordinary to the Royal Infirmary and a teacher of clinical surgery, and still found time to be a very busy surgeon in private practice. Later the Medical Research Council and other important bodies sought his services, and there were added weekly visits to London, when he had to travel overnight and return overnight to take up again the full daily routine, a strain upon his strength that many felt was unduly severe. It was not surprising, therefore, that on more than one occasion a temporary breakdown in health took place, to be quickly recovered from after a short rest in his country home at Gullane. Wilkie was deeply interested in social questions, and some years ago presented premises to Edinburgh University Settlement for use as an educational institute for working-class people. Known as Kirk o' Field College, this institute was formally opened by Sir James Barrie.

When it became known less than a month ago that he had again been ordered a complete rest by his physician Wilkie's friends were grieved but not unduly concerned. Fuller investigation, however, revealed a situation of great gravity. At first it looked as if the heroic measures found necessary were to prove successful, but this promise was not fulfilled, and he passed over, grateful for the happy life he had been granted and the many friends he had been given.

A narrative, however, of Wilkie's daily life and the steps that led up to the pinnacle he came to occupy would leave unsatisfied those who knew him as a man, who realized that wonderful personal fascination that he possessed: a great surgeon, a leader of research, an eloquent orator, and a true Christian gentleman has gone, one comparatively young in years but with a rich record of good work done, and leaving behind a name which will for long endure.

Sir John Fraser, Regius Professor of Clinical Surgery in the University of Edinburgh, writes:

Kirriemuir, a country town in the northern portion of Angus, is proud of the records of two distinguished men, J. M. Barrie and David Wilkie. Some months syne Barrie passed from the sight of men, and to-day we mourn the death of David Wilkie, a surgeon of superb ability, a man of wide sympathies and high achievements.

I do not know to what extent Wilkie and Barrie were acquainted at an earlier stage of their lives, but in later years, and particularly after the latter's appointment as Chancellor of Edinburgh University, a friendship developed between them which was mutual and sincere, and which was to some extent centred round a common bond of interests and ideals. Wilkie had many stories to tell of his visits to Barrie, and of the whimsical figure whom he found sitting in the inglenook by the fire, and I imagine that part of their talk would be of Thrums and of the window through which the world and his wife were measured. From Kirriemuir Wilkie went to school at the Edinburgh Academy. It was a time of awakening interests and new friendships, and it is a testimony to his sense of good fellowship that the links which were forged at that time have in great part persisted to the present day.

I believe he was one to whom the choice of a profession presented little difficulty. He was a man of high ideals and warm sympathies, and where could he find a better field for the exercise of these qualities than in the profession of medicine? He pursued his way with the interest and enthusiasm of a devotee, and he passed into the ranks of his profession well equipped for the future, and with a keen appreciation of the opportunities and the privileges which lay before him. Surgery made the strongest possible appeal to him, and he entered the career to which he gave such devoted and distinguished service. After a period of post-graduate study in Bonn, Berne, and Vienna he returned to Edinburgh, where he became associated with Professor Caird as his private assistant and clinical tutor.

It was at this time that he began the researches with which his name is so intimately associated. He was particularly interested in acute abdominal conditions, probably owing to his association with Caird, and when one reviews the work which he did at this time one is filled with admiration of the wide field which he covered, for the originality which he displayed, and for the accuracy with which his work was checked and controlled. His name will always be associated with advances in our knowledge of acute appendicitis, and it has an equal claim in connexion with such conditions as peritonitis, gastric and duodenal ulcer, intestinal obstruction, and the surgery of the spleen and the biliary tract. When, therefore, he was elected Professor of Systematic Surgery in 1924 it was a particularly fitting and appropriate appointment, for it afforded him the opportunity to organize and develop both the systematic and the research aspects of the Chair. That he was successful in the highest measure the years have shown, and to-day the departments which his genius created are a fitting tribute to his ability and his judgment.

Wilkie's genius as a teacher was outstanding. He possessed the faculty of presenting his subject in language which could not fail to attract and in a manner which made one feel the living reality of the problem with which he was dealing. The popularity of his classes was a testimony to the success of his methods. It was in the operating theatre, however, that he was seen at his best. There, with a technique which was faultless, with a dexterity that was equally complete, he operated and demonstrated in a manner that called forth sincere admiration. Those who witnessed his work will understand

something of the impression which I have attempted to convey.

Amidst these various responsibilities it might seem that his opportunity for other interests would be limited, but such was his energy and his enthusiasm that his activities extended into various spheres. It was characteristic of the man that whatever service he undertook was carried through to the utmost of his ability. It was the same in his University interests: he sat on Court and Senate and Faculty; each of these benefited from his wisdom, and in an amazing way he kept in closest touch with their multitudinous activities. It was a work in which he took particular pleasure, and it was done with an enthusiasm that gave inspiration to his associates. His administrative abilities had fuller scope when he became director of the surgical section of the municipal hospitals, a post which particularly appealed to him because it implied opportunity for new ventures and the development of a scheme of far-reaching possibilities.

Among these many claims he yet found time to lend a helping hand when aid was needed. He was Chairman of the Edinburgh University Settlement, and the Kirk o' Field College, the educational section of the scheme, owed its inception to his generosity and to his sympathy with those in distress. His association with the student body was in some respects unique, for, while he was a teacher to whom they gave the fullest measure of admiration and regard, he was at the same time as one of them, sharing their troubles and their difficulties, and rejoicing with them in their triumphs. He lived his life in the fullest and the best sense, and I believe he enjoyed every moment of it—the crowded hours of service, and the all too brief moments of leisure in his garden at Gullane or playing a round of golf at Muirfield. On the casket which bore him to his resting-place lay the flowers of late summer—gladioli, red roses, and sweet peas; they were probably culled from his own garden, and to those of us who saw them lying there they were a symbol not of death but of victory, for in their beauty and the glory of their colours there was that which said, "Life's battle won, now cometh rest."

Sir W. I. de C. Wheeler writes: The news of the death of Sir David Wilkie has come as a shock to the surgical world. I knew him intimately, and saw him often during the last twenty-five years. Ill-health had dogged his footsteps for more than twelve months, but they never faltered. What Wilkie has done for surgery and the Edinburgh school is universally recognized. His work will endure. Those in close touch with him will look back on days of inspiration in his presence, and an atmosphere of purity in the surroundings when he was at work. His religion included ceaseless endeavour (alas! persisted in during illness) to obtain results in the advance of science, for the good of the school, and for the benefit of all. His efforts were crowned by recognition at home and abroad. His memory will be perpetuated by those whom he taught and by the affection of his friends.

[The photograph reproduced is by Elliott and Fry, Ltd.]

Dr. HENRY HOWARD WHITEHOUSE, New York dermatologist and syphilologist, died at his summer home in Connecticut on August 24 in his seventy-fifth year. Associated with the New York Skin and Cancer Hospital for thirty-eight years, he was professor of dermatology at the New York Postgraduate Medical School from 1914 to 1925.

ALEXANDER MACPHAIL, M.D., F.R.F.P.S.G.

H.M. Inspector of Anatomy for England and Wales

Dr. Alexander Macphail, the distinguished anatomist, died on August 28 at the age of 65. He was born in Glasgow, the youngest son of Dugald Macphail, in 1872, and entered Glasgow University in 1890. As a student he was editor of the *Glasgow University Magazine*. He graduated M.B., C.M., with high commendation, four years later, and was soon Senior Demonstrator of Anatomy, an appointment which he was to hold until his election as Dean of the Faculty of Medicine at St. Mungo's College in 1900. In this same year Dr. Macphail became a Fellow of the Royal Faculty of Physicians and Surgeons of Glasgow. Only in 1907 did he leave Glasgow to take up a lectureship in anatomy at Charing Cross Hospital and King's College. In 1910 he was secretary for England of the second International Congress of Anatomy, which was held at Brussels. His appointment as lecturer in anatomy at St. Bartholomew's Hospital took place in 1912, and terminated on his transfer to the Ministry of Health in 1821; during the great war he served as a captain in the R.A.M.C.

Dr. Macphail was Emeritus Professor of Anatomy of St. Mungo's College, and was at one time chairman of the Board of Studies in Human Anatomy and Morphology of the University of London. He had been an examiner in anatomy for the Universities of Cambridge, London, Aberdeen, Glasgow, and St. Andrews. He acted as secretary for England and Scotland, and later as vice-president, of the Anatomical Society of Great Britain and Ireland, and was a former president of the Glasgow University Medical Chirurgical Society. He was secretary of the Section of Anatomy at the Annual Meeting of the British Medical Association in 1910, vice-president of the Section in 1912, and in 1922, as president of the Section at the meeting in Glasgow, he opened a discussion on the administration of the Anatomy Act (*Journal*, 1922, **2**, 787). In the year following this meeting he proceeded to the M.D. of his old university. He published several articles in the *Journal of Anatomy* and other special journals, but from 1921 onwards his interests were largely administrative. In that year he was appointed H.M. Inspector of Anatomy for England and Wales and a medical officer of the Ministry of Health. After the war the anatomy schools were faced with a difficult situation, the arrangements for obtaining subjects for dissection having partly broken down under the stress of changed conditions. The Minister of Health therefore agreed to ask boards of guardians to co-operate in the working of the Anatomy Acts. It was Dr. Macphail's task, on behalf of the Ministry, to secure the assistance of the boards of guardians and, later, of the public assistance committees. No better appointment could have been made for this purpose. Dr. Macphail was held in the highest esteem by his professional colleagues, and his frank and attractive character soon won the regard of the officers of local authorities. Arrangements were made to co-ordinate the supply of subjects in accordance with the needs of the various medical schools.

and their smooth working, now over many years, indicates that they were established on sound lines.

Macphail's heart was in his work, and he lost no opportunity of furthering anatomical studies. Since 1934 he had held the appointment of Professor of Anatomy at the Royal Academy of Arts—an honour which he valued highly. His health began to fail this year, and he resigned his appointments in July. His death so soon afterwards is a great loss to his colleagues and the many friends who appreciated his work and character.

Professor F. G. Parsons writes:

Alexander Macphail was lecturer in anatomy at St. Bartholomew's at a time when I held a similar appointment at St. Thomas's. Unfortunately, though we were always the best of friends, I did not come nearly so closely in touch with him then as I did when we were associated in the secluded but necessary task of finding the material without which the medical schools could not teach anatomy and surgery. It was then that I learnt to appreciate the infinite tact and forbearance with which he treated the people who formed the old boards of guardians. He persuaded them to see how necessary it was, in the interests of the poor, that students should have the opportunity of taking to pieces the human body, and so learning how it is constructed, before attempting to treat the living. Often we talked of the importance of inducing well-to-do people to bequeath their bodies to science as an answer to the demagogues who accused us of cutting up the friendless poor, while those who had money and friends could feel sure of a last sleep undisturbed. Macphail felt that until an anatomist had himself been dissected we should have no real answer to these people, and we agreed that while there was no difficulty in securing the consent of medical men to leave their bodies to the schools for dissection—indeed, it had been done many times—the real difficulty lay in gaining the consent of their relations, who, by giving it, would have to face the disapproval of others.

I knew well enough that it was Macphail's wish that he should be dissected when he died, but it was a surprise to me that the two relations who had nursed and cared for him so lovingly during his last illness should have agreed to carry out his wishes. So far from caring little what became of his remains, their action shows that they understood and took their part in this noble gesture. Macphail's body is to go to Oxford, a place chosen by himself, I think because of his friendship for the late Professor Arthur Thomson.

That his brother-anatomists will think of some fitting means of showing their deep regret at losing him, and their sympathy with his last act and with the loyalty of his relations, I do not doubt.

Mr. A. L. Moreton writes:

It was while Macphail was a student at Glasgow University that Lord Lister visited the scene of his former labours to address the students. After the meeting the students unharnessed the horse of Lister's cab and drew it themselves to Sir Hector Cameron's house, where he was staying. Macphail used to relate that he took part in this affair, and directed operations from the box seat of the cab. Some years later he came to London to succeed his friend, Lord (then Dr. Christopher) Addison, as lecturer on anatomy at Charing Cross Hospital when Addison went to St. Bartholomew's. When Charing Cross Hospital gave up teaching preliminary and intermediate subjects Macphail was offered the post of principal of the University of Hong Kong, and had about three days in which to make his decision. He decided not to go, and was for a time lecturer on anatomy at King's College, before succeeding Dr. Addison again at St. Bartholomew's. As a teacher of anatomy to students, both of medicine and of pictorial art, Macphail was in the first rank: a clear and simple expounder of his subject, and an excellent blackboard artist, rivalling his old friend, Arthur Thomson of Oxford, whom he succeeded as professor of anatomy at the Royal Academy. Above all, Macphail had a real genius for friendship, both with members of his own profession and with others. His students and demonstrators all knew that in him they had a real friend, to whom they could come with their difficulties and troubles, well knowing that they would always receive sympathy and the best of advice. Apart from his work, he was an ideal companion for a walk through the streets of the City, through the countryside, or among the hills and lochs from which came his forebears.

[The photograph reproduced is by Elliott and Fry, Ltd.]

THOMAS DAVIES HARRIES, F.R.C.S., M.R.C.P.

Honorary Surgeon, Aberystwyth Infirmary and Cardiganshire General Hospital

We regret to announce the death on July 14 of Dr. Thomas Davies Harries. He qualified L.S.A. in 1871, afterwards taking the F.R.C.S. in 1877 and the M.R.C.P. in 1892.

A friend and colleague writes: Dr. Harries entered Guy's in 1867, and brought with him all the sporting characteristics of his native county of Pembroke. He was an expert fisherman, a good judge of horseflesh, and an excellent rider to hounds. Whilst at Guy's he became prominent as a boxer. He had an exceedingly fine bedside manner, and invariably won the confidence and affection of his patients. His practice was a very extensive one, and at one time included the largest consulting practice in Mid-Wales. Patients whom he treated at Aberystwyth frequently wanted him for consultation, and that before the days of motor cars.

Among his closest friends at Guy's was the late Sir Samuel Wilks, who advised him to settle down at a seaside resort. As a consequence Aberystwyth became the place of his choice, and for sixty years and upwards until his death he resided there, taking an active interest in all phases of public life and contributing his share to the management and government of the town by serving as town councillor, alderman of the borough, and mayor of the town on more than one occasion. Not the least of his remarkable characteristics was his wonderful versatility. His interests were not entirely confined to his practice, but included a close study of lead-mining and engineering problems connected therewith.

He married Miss Annette Benson of Royal Avenue, London. When they celebrated their diamond wedding on December 5, 1937, they received a telegram of congratulation from the King and Queen.

The following well-known foreign medical men have recently died: Dr. SÖREN HOLTH, an eminent ophthalmologist of Oslo, who was awarded in 1919 the Fridtjof Nansen prize for glaucoma, aged 74; Professor WILHELM BERGER, lecturer on medical aspects of air travel, from an aeroplane accident, aged 43; Dr. HERMANN STRAUB, director of the medical clinic at Göttingen, aged 55; Dr. ERNEST CURCHOD of Lausanne, president of the Swiss Society of Oto-rhino-laryngology; Dr. GEORGES MALOENS, an eminent Brussels laryngologist; Professor HANS CLAUS, an eminent Berlin oto-rhino-laryngologist, aged 64; Dr. LUIS CALVO MACKENNA of Chile, one of the most notable paediatrists in South America; and Professor GIUSEPPE FRANCHINI, founder and director of the clinic for tropical diseases at Bologna.

No. 34.

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended August 27, 1938.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland. Median values for the last 9 years for (a) and (b).

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns (124 in 1937) in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns (9 in 1937) in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1938					1937 (Corresponding Week)					1929-37 (Median Value Corresponding Weeks)	
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)	(a)	(b)
Cerebrospinal fever	13	2	7		1	13	2	5		1		
Deaths		—	2				—	—				
Diphtheria	963	112	137	50	18	910	108	167	54	20	838	141
Deaths	21	6	3	3	—	23	1	10	1	—		
Dysentery	32	9	25		1	23	7	11		—		
Deaths				—	—				—	—		
Encephalitis lethargica, acute	4	—	—	1	—	5	—	—		—		
Deaths		—					—					
Enteric (typhoid and paratyphoid) fever	47	8	10	11	1	57	8	14	44	1	62	
Deaths	3	1	—	—	—	5	2	—	1	—		
Erysipelas			46	2	1			62	5	3		
Deaths		—					1					
Infective enteritis or diarrhoea under 2 years												
Deaths	55	11	2	13	4	34	7	12	17	8		
Measles			38		4			18		—		
Deaths	4	—	1	—	—	4	—	1	1	—		
Ophthalmia neonatorum	84	6	22		—	115	8	49		—		
Deaths												
Pneumonia, influenzal†	267	15	3		2	318	25	6		5	414	34
Deaths (from Influenza)	10	—	—	—	—	14	2	—	—	—		
Pneumonia, primary			70	1				107	2			
Deaths		8		2	7		10		4	4		
Polio-encephalitis, acute	5	—				4	1					
Deaths		—					—					
Poliomyelitis, acute	71	9	10	2	2	40	10	—		1		
Deaths		—					—					
Puerperal fever	2*	2	17	2		46	4	18	5			
Deaths		—					—					
Puerperal pyrexia	126	12	20		—	139	18	19		—		
Deaths												
Relapsing fever	—	—			—	1	—	—		—		
Deaths												
Scarlet fever	1,224	90	291	43	56	1,195	88	307	37	42	1,452	227
Deaths	1	—	—	—	—	3	2	2	—	—		
Small-pox	—	—			—	—	—	—		—		
Deaths	—	—		—	—	—	—		—	—		
Typhus fever	—	—	—	—	—	—	—	—	—	—		
Deaths				—	—				—	—		
Whooping-cough			72		11			69		11		
Deaths	9	—	3	1	2	18	3	4	—	—		
Deaths (0-1 year)	274	38	33	29	15	254	41	59	30	18		
Infant mortality rate (per 1,000 live births)	46	31				43	34					
Deaths (excluding stillbirths)	3,728	640	480	175	111	3,579	661	486	150	103		
Annual death rate (per 1,000 persons living)	9.2	8.2	9.8	11.8	9.8	8.8	8.3	9.9	10.2	9.1		
Live births	6,721	1,240	821	362	242	6,628	1,178	865	414	225		
Annual rate per 1,000 persons living	16.5	15.8	16.7	24.5	21.5	16.4	14.8	17.7	28.2	19.9		
Stillbirths	269	38				268	44					
Rate per 1,000 total births (including stillborn)	38	30				39	36					

* After October 1, 1937, puerperal fever was made notifiable only in the administrative County of London.

† Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland

EPIDEMIOLOGICAL NOTES*

Acute Poliomyelitis

The incidence of acute poliomyelitis in England and Wales continues to decline, the numbers for the last three weeks for which figures are available being 81, 77, and 71 (week under review) respectively; while in London during the same period slight increases were noted, the numbers being 3, 7, and 9 respectively. In Scotland the notifications fell from 14 to 10, and in Eire from 4 to 2, while in Northern Ireland 2 cases were notified (*nil* in the previous week). Notifications of two or more cases were received from: Ashford 2, Blackburn 2, Braintree and Bocking (Urban) 5, Braintree (Rural) 2, Cuckfield (Urban) 2, Cuckfield (Rural) 3, Southend 2, Swansea 4, Worthing 2. The London cases were distributed thus: Kensington 4, and 1 each in Lambeth, Lewisham, St. Marylebone, Shoreditch, and Wandsworth. In the week following 4 fresh cases were reported at Braintree, bringing the total, at the time of going to press, in the outbreak to 51. The Essex outbreak continues to cause concern, despite the action taken in postponing the reopening of the schools and in discouraging gatherings of persons of susceptible age at parties and cinemas. It does not appear that immune serum, convalescent or horse, has been used on any scale in either prophylaxis or treatment.

Reports have come to hand of a number of cases of poliomyelitis in Holland, and in many centres reopening of schools has been postponed for one or two weeks. The German authorities have forbidden the crossing of the frontier at some places to all children under the age of 14 years. In Germany itself an outbreak at Frankfort-on-Main is reported, in which 27 children have died from the disease this year. The chief measures taken to check the epidemic have been prohibition of all meetings and assemblies of children and closure of schools until further notice.

Typhoid Fever

Notifications of typhoid fever have risen in the last three weeks, the numbers being 24, 34, and 47 (week under review) respectively; during the same period the figures for London were 1, 4, and 8 respectively. Notifications of two or more cases were received from: Axminster 2, Birmingham 2, Colchester 2, Driffield 2, Farnworth 3, Okehampton 2, Thurrock 5, York 2. In London the cases were distributed thus: Bermondsey 2, and 1 each in Battersea, Camberwell, Chelsea, Islington, Lambeth, Southwark. The Farnworth outbreak seems to be at an end, no new cases having occurred in the last fortnight; the total number has been 44 cases with 7 deaths. The 2 cases notified at Axminster in the week under review were referred to in these columns last week.

Reports have come to hand of an outbreak of typhoid fever among Europeans in Simla, India, in which more than 200 cases have occurred in the last month.

Diphtheria and Scarlet Fever

Notifications of diphtheria in England and Wales during the week were practically stationary, 963 (961) cases being recorded; but in London there was an appreciable drop—112, compared with 144. Deaths in the 126 Great Towns of England and Wales fell from 25 to 21, but in London they rose from 3 to 6: of the 21 deaths in the 126 Great Towns 3 (3) occurred in Liverpool and 2 (0) in Cardiff. There was a rise in the notifications of scarlet fever both in England and Wales and in London during the week, the figures being 1,224 (1,067) and 90 (76) respectively: the chief centres in England and Wales in which increases were recorded are: Birkenhead 6 (3), Stockport 9 (6), Poole 5 (2), Darlington (Durham) 5 (2), West Ham 14 (8), Romford 10 (5), Bristol 17 (6), Liverpool 44 (28), Manchester 32 (27), Southport 6 (1), Edmonton 14 (3), Finchley 12 (2), Norwich 4 (1), Newcastle-upon-Tyne 7 (3), Ipswich 5 (1), Croydon 7 (2), Birmingham 28 (21).

Measles and Whooping-cough

During the week there were 4 deaths from measles in the 126 Great Towns—1 each in Blackburn, Gateshead, Sheffield, and Birmingham—compared with 2 in the previous week. The average daily admissions to the L.C.C. fever hospitals were 3 (3); in the metropolitan boroughs in which measles is notifiable notifications were lower in five, remained the same in four, and rose in two—Battersea 3 (0) and Stepney 1 (0). In Scotland notifications fell from 42 to 38 during the week; of the 38 cases 12 (4) occurred in Dunfermline, 10 (2) in Zetland, and 8 (2) in Glasgow. There was 1 death (in Paisley) from measles in the 16 principal towns of Scotland during the week. In the 126 Great Towns of England and Wales 9 (7) deaths from whooping-cough were reported—2 (0) in Liverpool and 1 each in Bradford, Leeds, Manchester, Middlesbrough, Bath, Plymouth, Acton. In Scotland 72 (62) cases of whooping-cough were notified, 58 (47) of which were in Glasgow, and 3 (5) deaths—2 (3) in Glasgow and 1 (0) in Paisley.

Cholera

During the week ended August 27, 586 cases of cholera and 165 deaths were reported in Shanghai, and in Hong Kong 21 cases with 15 deaths. Tientsin, in North China, has been added to the list of ports with cholera. The Japanese Foreign Office is co-operating with the Japanese Medical Association for China in the organization of travelling hospitals for the treatment of cases and in providing facilities for prophylactic inoculation of those at risk. In British India 7,314 cases with 3,648 deaths were notified in the Central Provinces, 612 cases with 218 deaths in Bombay (Presidency), 222 cases with 86 deaths in Madras (Presidency), 243 cases with 107 deaths in the North-West Frontier Province, 378 cases with 198 deaths in the United Provinces.

* Except where otherwise mentioned, figures in parentheses refer to the week preceding the one under review.

Medical News

The Central Council for Health Education has decided to make a new appointment of a general secretary to act as chief officer of the Council at a salary of £750 rising to £900 per annum. The terms of the appointment will be found in our advertisement columns. It will be noticed that the appointment is open to both medical practitioners and laymen.

In our advertisement columns this week the University of Birmingham invites applications for the Chair of Anatomy at a stipend of £1,000 per annum.

The new Early Treatment Centre, Berwick House, attached to St. Luke's Hospital, Grove Hill, Middlesbrough, will be officially opened on Wednesday, September 14, at 3 p.m., by Sir Hubert Bond, D.Sc., M.D., F.R.C.P., Senior Commissioner, Board of Control.

At the annual congress of the National Veterinary Medical Association of Great Britain and Ireland, held in Glasgow this week, papers were read by Professor Edward Hindle on filterable viruses with special reference to immunity, and by Drs. Tom Hare and R. M. Fry on clinical observations on the beta-haemolytic streptococcal infection of dogs.

A neo-Hippocratic congress will be held at Marseilles on September 29 under the presidency of Dr. Cornil, dean of the medical faculty, when the following papers will be read: The Hippocratic Doctrine and Induction in Medicine, by Professor Laignel-Lavastine; Hippocrates and the School of Cnidos, by Professor Guiart; The Pre-clinical Period of Diseases, by Professors Marañon, Guy Laroche, Delore, and Cornil, and Dr. Morlaas; The Treatise on Fractures, by Dr. Poucel; and The Professional Tradition in Hippocrates, by MM. Benoit and Foeta. Further information can be obtained from Dr. Martiny, 10, Rue Alfred Roll, Paris.

The September issue of the *Practitioner* is devoted to disorders of sex, contributors being Drs. Havelock Ellis, H. Crichton-Miller, J. A. Hadfield, Laura Hutton, Desmond Curran, and Mr. Kenneth Walker.

Mr. J. P. Lockhart-Mummery's Mayo Foundation lecture on the operative surgery of the colon, delivered at Rochester, Minnesota, in October last, is published in the *Proceedings of the Staff Meetings of the Mayo Clinic* for August 3.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone, unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

Authors desiring REPRINTS of their articles published in the *British Medical Journal* must communicate with the Secretary, B.M.A. House, Tavistock Square, W.C.1, on receipt of proofs. Authors overseas should indicate on MSS. if reprints are required, as proofs are not sent abroad.

All communications with reference to ADVERTISEMENTS should be addressed to the Advertisement Manager. Orders for copies of the *Journal* and communications with reference to subscriptions should be addressed to the Secretary, B.M.A. House, Tavistock Square, W.C.1.

The TELEPHONE NUMBER of the British Medical Association and the *British Medical Journal* is EUSTON 2111.

The TELEGRAPHIC ADDRESSES are

EDITOR OF THE *BRITISH MEDICAL JOURNAL*, *Aitiology Westcent, London.*

SECRETARY, *Medisecra Westcent, London.*

The address of the B.M.A. Scottish Office is 7, Drumsheugh Gardens, Edinburgh (telegrams: *Associate, Edinburgh;* telephone 24361 Edinburgh), and of the Office of the Cumann Doctúirí na h-Éireann (I.M.A. and B.M.A.), 18, Kildare Street, Dublin (telegrams: *Bacillus, Dublin;* telephone 62550 Dublin).

QUERIES AND ANSWERS

Origin of the Laryngoscope

Dr. R. A. D. POPE (Chester) writes: Your reference on August 6 under "Nova et Vetera" to Crampton Smyly and the laryngoscope prompts me to ask a question which has puzzled me lately. Who invented the laryngoscope? Most medical and musical works, I believe, credit it to Manuel Garcia, about 1850. Yet Bryant (*Surgery*, 1884) says: "The first laryngoscope was introduced in 1829 by . . . B. G. Babington of Guy's Hospital . . . under the term 'glottiscope.'" Can anyone settle the point?

*** On March 18, 1829, a rude "glottiscope" was exhibited to the Hunterian Society of London by Benjamin Babington of Guy's Hospital, and in 1837 the Edinburgh surgeon, Robert Liston, described his mode of exploring the larynx. Babington's invention is recorded in the *London Medical Gazette*, 1829, **3**, 555. As Fielding Garrison notes in his *Introduction to the History of Medicine*, these efforts passed without remark and the modern laryngoscope came to be invented by Manuel Garcia, a Spanish singing teacher in London, who sent an account of his instrument to the Royal Society in 1855. Three years later his method of examining the throat was made a permanent part of laryngology by J. N. Czermak of Prague and Ludwig Türck of Vienna.

Chronic Uric Acid Dermatitis

"A. B." writes: Will someone recommend the best treatment, both externally and internally, for a case of chronic uric acid dermatitis of the hands of some years' duration. Various treatments have been tried without success.

Treatment of Superficial Glossitis

"O. M. N." writes: Could anyone advise me as to the treatment of a case of obstinate superficial glossitis? The patient is a woman aged 45. There is no anaemia; a relapse of old-standing bacilluria has been treated and digestive troubles dealt with; her dentures have also been seen to, and her general health seems good at present. The condition healed completely while she was away on holiday, but has returned after two days at home and is now as bad as ever.

Income Tax

Service Gratuity

D. D. S. P. has completed five years as surgeon lieutenant R.N. and has received a "gratuity" of £1,000 on transfer to the "Permanent List." He has been informed officially that the sum "is part of the officer's income for the year in which it is paid," and he inquires whether it should not be spread over the five years of service.

*** Official pay is assessable under Schedule E and tax is chargeable "in respect of all salaries, fees, wages, perquisites, or profits whatsoever . . . for the year of assessment." The language might perhaps be clearer on the point raised, but in recent years judicial dicta have shown an increasing tendency to approve of taxability as at the moment when the income becomes due. If the amount in question becomes due as at the end of the five years—for example, so that no part of it could be claimed on prior resignation—it would, we consider, be unwise to carry to appeal a contention that it accrued from year to year, and therefore should be spread. But we agree that in the result some hardship may be inflicted when rates of tax are rising.

Allowance for Wife's Earnings

"C. H." understands that as his wife assists to a considerable degree in the management of his practice he can obtain some special allowance for any salary paid to her. In the past he has "not paid her any sums specifically labelled as salary," but has made substantial payments in bills and gifts of money, etc.

*** Section 18 of the Finance Act, 1920, provides that if a wife has any earned income the usual "married" personal allowance, now £180, shall be increased by four-fifths of that earned income, but not exceeding £45. If therefore a practitioner enters into a binding arrangement with his wife to pay her, say, £50 per annum for assistance in his practice, he can deduct that amount as a professional expense, but as four-fifths of £50 = £40 is less than the maximum £45 special allowance his wife will not be liable to payment of tax thereon. The revenue authorities usually require some evidence that the £50 was paid as between employer and employee and not as part of the domestic financial arrangements between husband and wife—that is, that a sum was agreed as payable for services to the practice, that some duties were in fact performed, and that the agreed payments were made and duly recorded in the books of the practice. Retrospective effect to such arrangements will not be given.

LETTERS, NOTES, ETC.

Modern Art for the Hospital

Framed pictures are cheerful but solicit microbes. Hence the yawning bareness of hospital walls. In New York City the W.P.A. (Works Progress Administration) has lately commissioned some artists to paint murals—all examples of the modern school—for some of the City hospitals. The results are interesting both artistically and from the point of view of their possible psychological effect upon the patients. At the Queens General Hospital the most striking mural in the panorama Medicine through the Ages is one entitled Foibles of Medicine. Historical accuracy is the keynote of the Lister mural, in which the great surgeon is shown washing his hands in carbolic acid solution, while a nurse devotedly sprays the operating theatre with the antiseptic. In the Willard Parker Hospital's Men of Medicine series the Louis Pasteur mural is somewhat domineeringly effective.

Medical Postage Stamps

A new French 55 + 45-centimes charity stamp, cardinal red in colour and impressively simple in design, depicts a central monument with the inscription, "A la gloire du service de santé," and in the top right-hand corner the serpent of Aesculapius entwining a staff.

In honour of the "Journées Médicales" held at Beirut last May, Lebanon has issued a set of four postage stamps depicting the medical school (2 piastres light green, 3 light orange, 5 slate, and 10 light red).

Corrigendum

Dr. JAMES A. LISTER (Glasgow) writes: I regret that an error has crept into a letter of mine published in the *Supplement* of August 27 (p. 169). The phrase "but that, of course, is the penalty of such a democratic Government as our own," should have read "but that, of course, is the penalty of such a democratic government as that of our own Association."